



VTRAK

M-CLASS

M500f, M500i, M500p, M300f, M300i, M300p,

M200f, M200i, M200p

PRODUCT MANUAL

Version 1.5 / SR-3

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Chapter 1: Introduction

- About This Manual (below)
- Overview (page 2)
- Architectural Description (page 3)
- Specifications (page 6)

Thank you for purchasing Promise Technology's VTrak M-Class external disk array subsystem.

About This Manual

This *Product Manual* describes how to setup, use, and maintain the VTrak M-Class 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.

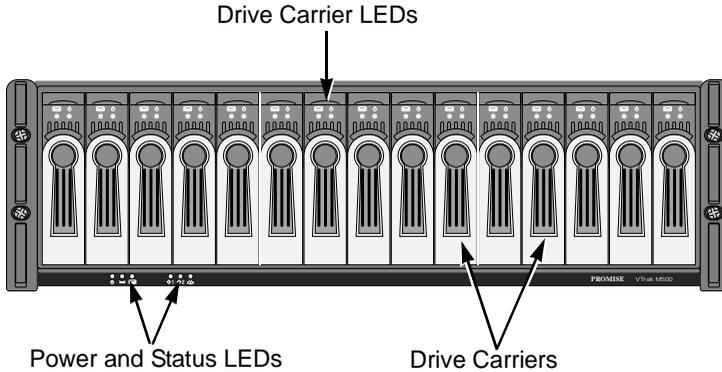


Figure 1. VTrak M500f/i/p front view

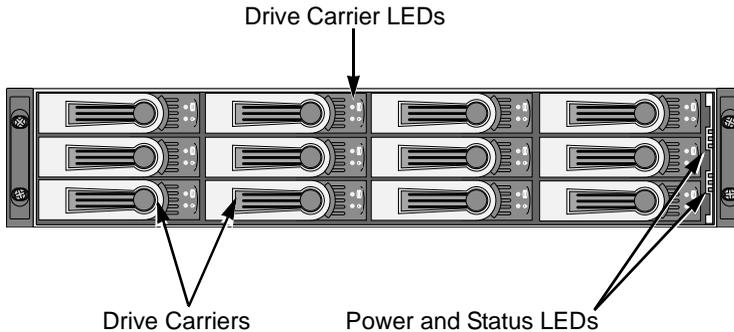


Figure 2. VTrak M300f/i/p front view (M200f/i/p is similar)

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.

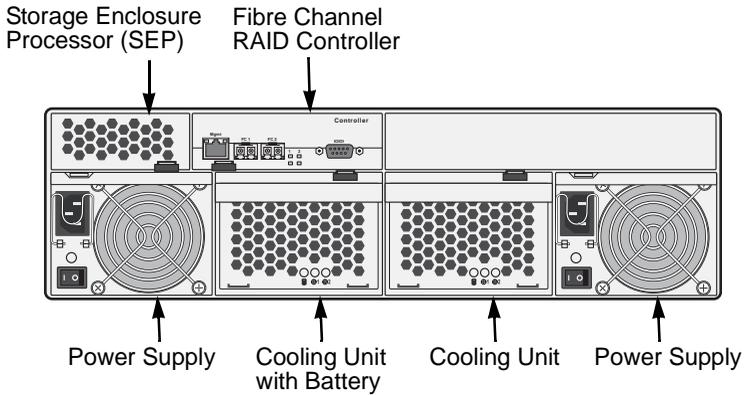


Figure 3. VTrak M500f Rear View (M500i/p have different controllers)

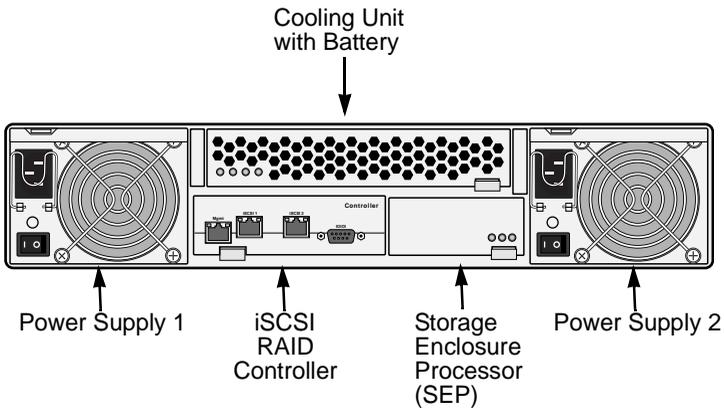


Figure 4. VTrak M300i/M200i Rear View (M300f/M200f and M300p/M200p have different controllers)

Architectural Description

The VTrak M-Class is a Direct Attached Storage (DAS) subsystem that can also function in a Storage Area Network (SAN). The subsystem supports 1.5 Gb/s and 3.0 Gb/s SATA drives:

- VTrak M500f/i/p supports up to 15 disk drives in a 3U enclosure
- VTrak M300f/i/p supports up to 12 disk drives in a 2U enclosure
- VTrak M200f/i/p supports up to 8 disk drives in a 2U enclosure

All M-Class 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
M500f/i/p: 3U 19-inch wide enclosure	Installs easily in any standard rackmount.
M300f/i/p and M200f/i/p: 2U 19-inch wide enclosure	Installs easily in any standard rackmount.
Supports RAID levels 0, 1, 1E, 5, 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.
Up to 25K IOPS (over two Fibre Channel or two iSCSI ports)	High processing rate.
1 Gb or 2 Gb sustained bandwidth (Fibre Channel)	High data throughput.
Up to 1 Gb/sec sustained bandwidth (iSCSI)	High data throughput.

Feature	Benefit
Hardware-assisted XOR engine	High-speed parity calculation for parity type logical drives.
Supports out-of-band management through RS232 and 10/100/1000 BaseT Ethernet connections	Allows you to manage the RAID subsystem while maximizing bandwidth on the iSCSI network.
Supports SNMP (v2) CIM and WBEM standards	API-ready for enterprise management integration.
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 Fibre Channel ports (f models)	Load sharing and full operation even with a failed FC port.

Feature	Benefit
Redundant iSCSI ports (i models)	Load sharing and full operation even with a failed iSCSI port.
Redundant SCSI ports (p models)	Load sharing and full operation even with a failed SCSI port.
Cluster support	Supports two- and four-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.
Command-line and graphic-user interfaces	Choice of control and monitoring methods for greater flexibility.

Specifications

M500f/i/p

Drive Capacity: 15 SATA disk drives (3.5" x 1" form factor only).

External I/O Ports (M500f): Dual 1-Gb/2-Gb Fibre Channel ports.

External I/O Ports (M500i): Dual 1-Gb iSCSI ports

External I/O Ports (M500p): Dual 320-MB SCSI ports

Sustained Throughput (M500f): Up to 4 Gb/s (over two FC ports).

Sustained Throughput (M500i): Up to 2 Gb/s (over two iSCSI ports)

Sustained Throughput (M500p): Up to 640 MB/s (over two SCSI ports)

Sustained I/Os: Up to 25,000 I/Os per second.

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 10
- RAID 50

Any combination of these RAID levels can exist at once on separate logical drives. See page 239 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 per array in any combination of RAID levels and drive types. 256 LUNs total.

Supported Disk Interfaces: Serial ATA (SATA)

Supported Operating Systems:

- Windows 2000
- Windows XP Professional
- Windows 2003
- RedHat Linux
- SuSE Linux
- Novell Netware
- Sun Solaris

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

Power Consumption: 440 watts

Power Supply: Dual 500W, 100–240 VAC auto-ranging, 50–60 Hz, dual hot swap and redundant with PFC, N+1 design

Thermal Output: 1590 BTU/hour (max current)

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, WBEM, Telnet

Notification: Email, audible, and visible alarms

Dimensions: Height, 5.12 in (13.00 cm); Width, 17.48 in (44.40 cm); Depth, 22.17 in (56.30 cm)

Weight: 68.34 lbs (31.00 Kg) without drives; 84.88 lbs (38.50 Kg) with 15 drives installed

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

Limited Warranty: 3 Years (See page 302 for details)

M300f/i/p, M200f/i/p

Drive Capacity (M300f/i/p): 12 SATA disk drives (3.5" x 1" form factor only).

Drive Capacity (M200f/i/p): 8 SATA disk drives (3.5" x 1" form factor only).

External I/O Ports (M300f/M200f): Dual 1-Gb/2-Gb Fibre Channel ports.

External I/O Ports (M300i/M200i): Dual 1-Gb iSCSI ports

External I/O Ports (M300p/M200p): Dual 320-MB SCSI ports

Sustained Throughput (M300f/M200f): Up to 4 Gb/s (over two FC ports).

Sustained Throughput (M300i/M200i): Up to 2 Gb/s (over two iSCSI ports)

Sustained Throughput (M300p/M200p): Up to 640 MB/s (over two SCSI ports)

Sustained I/Os: Up to 25,000 I/Os per second.

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 10
- RAID 50

Any combination of these RAID levels can exist at once on separate logical drives. See page 239 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
- Novell Netware
- Sun Solaris

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

Power Consumption: 340 watts

Power Supply: Dual 400W, 100–240 VAC auto-ranging, 50–60 Hz, dual hot swap and redundant with PFC, N+1 design

Thermal Output: 1160 BTU/hour (max current)

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, 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: M300f/i/p, 55.12 lbs (25.00 Kg) without drives; 68.34 lbs (31.00 Kg) with 12 drives installed

Weight: M200f/i/p, 50.71 lbs (23.00 Kg) without drives; 59.52 lbs (27.00 Kg) with 8 drives installed

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

Limited Warranty: 3 Years (See page 302 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 M500f/i/p in a Rack (page 12)
 - Mount VTrak M300f/i/p or M200f/i/p in a Rack (page 14)
 - Install Disk Drives (page 16)
 - Set Up Network Cable Connections (page 20)
 - Set Up Serial Cable Connections (page 25)
 - Connect the Power (page 26)
-

Unpack the VTrak

The VTrak box contains the following items:

- VTrak Unit
- Quick Start Guide
- Null Modem Cable
- Left and right mounting rails
- 1.0m External VHDCI SCSI cables (2 for M500p/M300p, 1 for M200p)
- Screws for disk drives (36 for M200f/i/p; 52 for M300f/i/p; 64 for M500f/i/p; including 4 spares)
- 1.5m (4.9 ft) Power cords (2)
- 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 M500f/i/p in a Rack

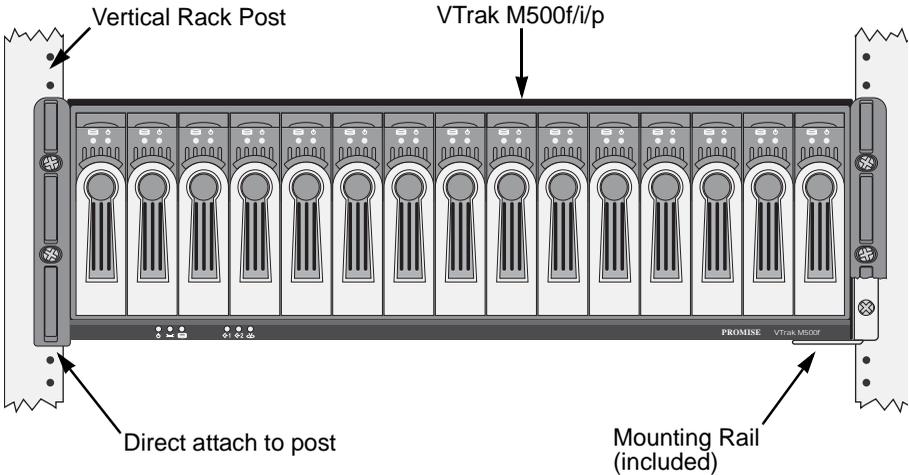


Figure 1. Rackmounted VTrak M500f/i/p

The VTrak M500f/i/p installs directly to the rack with or without using the supplied mounting rails.

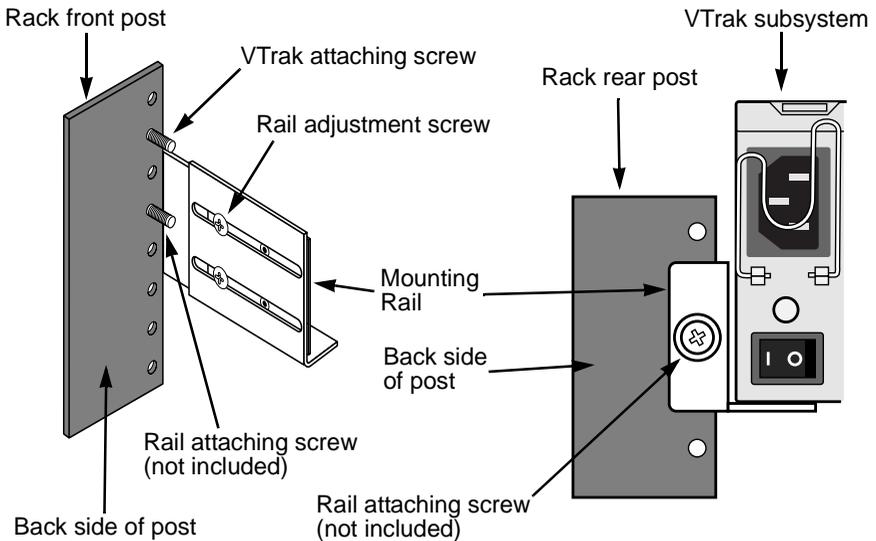


Figure 2. Mounting rail installation

If you plan to use the mounting rails, follow this procedure to install them:

1. Attach one end of the rail to the back side of the rack's front post.
2. Reposition the adjusting screws as needed to fit the rail to the rack properly.
3. Attach the other end of the rail to the back side of the rack's rear post.
4. Repeat steps 1 through 3 to attach the other rail.
5. Square the rails in the rack and tighten the attaching screws.
6. Set the VTrak onto the rails.
7. Attach the VTrak to the rack's front posts with the screws provided.



Caution

Do not pull or push the handles on the Power Supplies or the Controller units in order to move the VTrak. Hold the VTrak by the housing only.

Mount VTrak M300f/i/p or M200f/i/p in a Rack

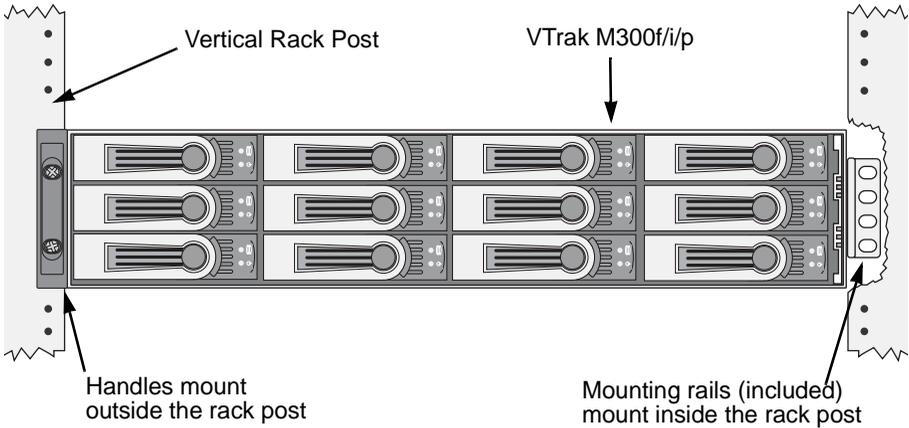


Figure 1. Rackmounted VTrak M300f/i/p (M200f/i/p is similar)

The VTrak M300f/i/p or M200f/i/p installs to the rack using the supplied mounting rails. You can also use your existing rails.

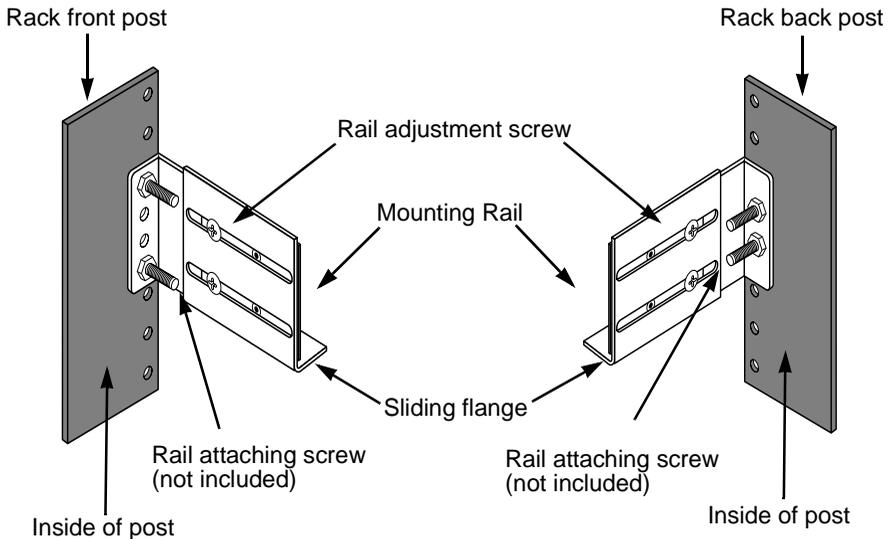


Figure 2. Mounting rail installation

Follow this procedure to install the rails:

1. Check the fit of the rails in your rack system.
2. Slide the plates out of the rails.
3. Attach the rail plates to the VTrak housing.
Line-up the rail plates using the studs. Install with six screws each side.
4. Slide the rails over the plates.
5. Attach the sliding flanges to the rails with the adjustment screws provided.
6. Attach the four-hole flange to the inside of the rack's front post.
7. Attach the two-hole flange to the inside of the rack's rear post.
8. Repeat steps 6 and 7 to attach the other rail.
9. Square the rails in the rack and tighten the attaching screws (not included).



Cautions

- Do not lift or move the VTrak by the handles on the housing, power supplies or the controller units. Hold the VTrak by the housing only.
 - Do not install the VTrak into a rack without rails to support it.
-

Install Disk Drives

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

- VTrak M500f/i/p supports up to 15 disk drives
- VTrak M300f/i/p supports up to 12 disk drives
- VTrak M200f/i/p supports up to 8 disk drives

All VTrak M-Class models provide the RAID configurations listed below. See Chapter 7, page 239 for a complete explanation of RAID on VTrak.

RAID Configuration	Number of disk drives	
	Minimum	Maximum
RAID 0	1	15
RAID 1	2	2*
RAID 1E	3	15
RAID 5	3	15
RAID 10	4	14
RAID 50	6	15
* RAID 1 logical drives work in matched pairs. VTrak M500f/i/p supports up to seven (7) RAID 1 logical drives. M300f/i/p supports up to six (6) RAID 1 logical drives. M200f/i/p 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.

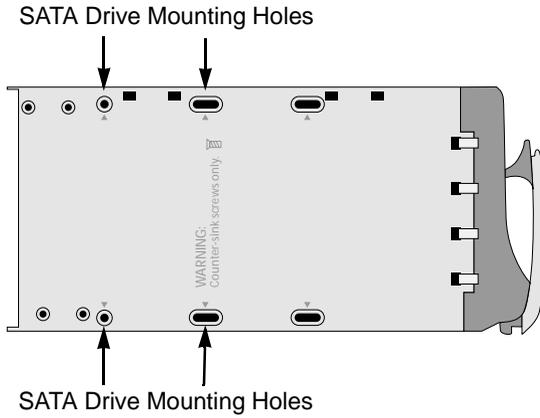


Figure 10. M500f/i/p drive carrier mounting holes

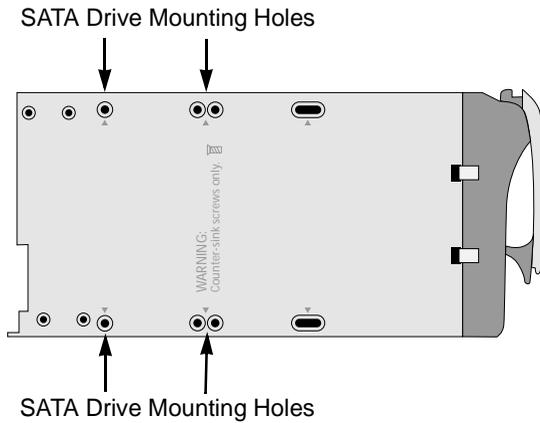


Figure 11. M300f/i/p and M200f/i/p drive carrier mounting holes



Figure 12. 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 4).
 - 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.
4. Repeat these steps until all of your disk drives are installed.



Cautions

- 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.
 - A VTrak M500f/i/p carrier is shown above. The VTrak M300f/i/p and M200f/i/p carrier is similar in appearance but the two carrier designs are NOT interchangeable.
-



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.

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.



VTrak disk drives are numbered left to right

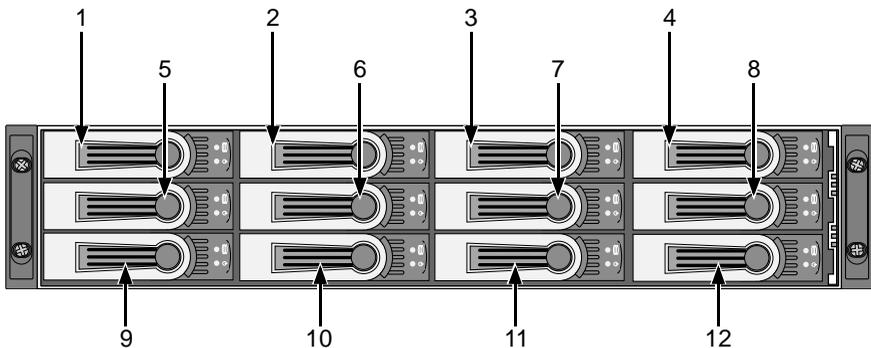


Figure 7. VTrak M300f/i/p disk drives are numbered as shown. The M200f/i/p is similar, with 8 disk drives

Set Up Network Cable Connections

The VTrak M500f, M300f, and M200f share the same RAID controller design and use Fibre Channel (FC) connections for the data ports.

The VTrak M500i, M300i, and M200i share the same RAID controller design and use iSCSI connections for the data ports.

You can configure your VTrak data connections for a:

- Storage Area Network (SAN)
- Direct Attached Storage (DAS)

The VTrak M500p, M300p, and M200p share the same RAID controller design and use SCSI connections for the data ports. SCSI is limited to a DAS solution.

All VTrak models in this series have a single Ethernet (RJ-45) Management Port connector that enables you to monitor the VTrak over your network using the WebPAM PROe Software. VTrak supports Ethernet and Telnet protocols.

Fibre Channel Storage Area Network.

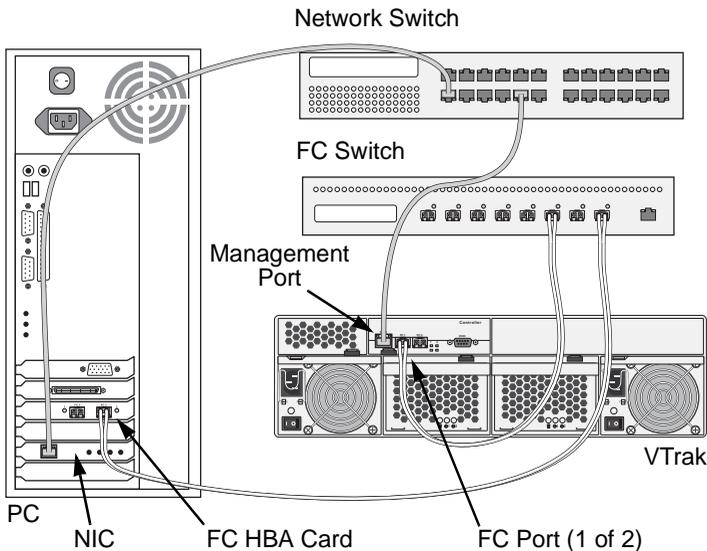


Figure 8. VTrak M500f SAN connections (M300f and M200f are similar)

This arrangement requires:

- A Fibre Channel switch
- A Fibre Channel HBA card in the Host PC

- A network switch
- A network interface card (NIC) in the PC

Connect the VTrak Fibre Channel data ports to your Fibre Channel switch to establish the data path.

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

Fibre Channel Direct Attached Storage

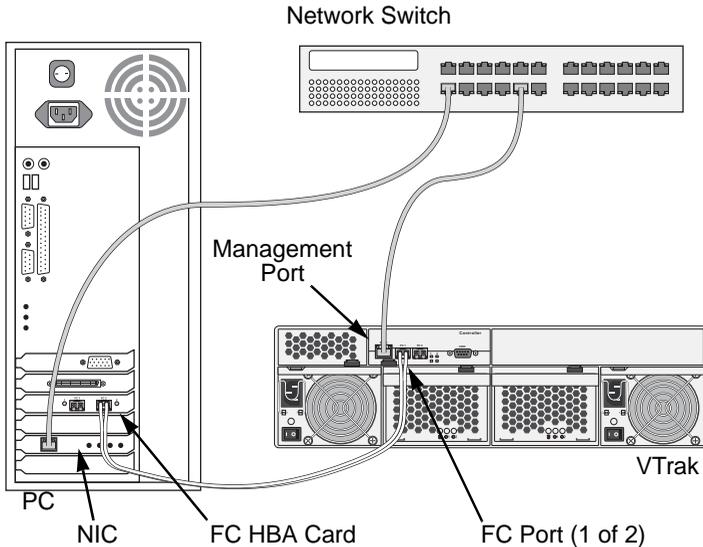


Figure 9. VTrak M500f DAS connections (M300f and M200f are similar)

This arrangement requires:

- A Fibre Channel HBA card in the Host PC
- A network switch
- A network interface card (NIC) in the PC

Connect the VTrak Fibre Channel data ports to your Fibre Channel HBA card in your PC to establish the data path.

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

iSCSI Storage Area Network

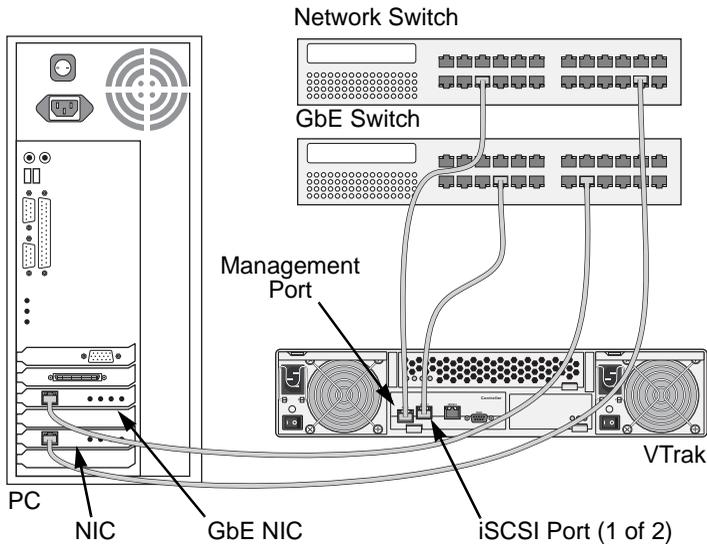


Figure 10. VTrak M300i and M200i SAN connections (M500i is similar)

This arrangement requires:

- A Gigabit Ethernet network interface card (GbE NIC) with iSCSI support (in hardware or software)
- A GbE Switch with iSCSI support
- A network switch
- A network interface card (NIC) in the PC

Connect the 1 GbE (iSCSI) NIC and VTrak Data Ports to your GbE switch to establish an isolated data path.

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

As an alternative, you can use the same GbE (iSCSI) NIC for your PC for management and data connections. However, combining management and data paths this way will reduce performance.

iSCSI Direct Attached Storage

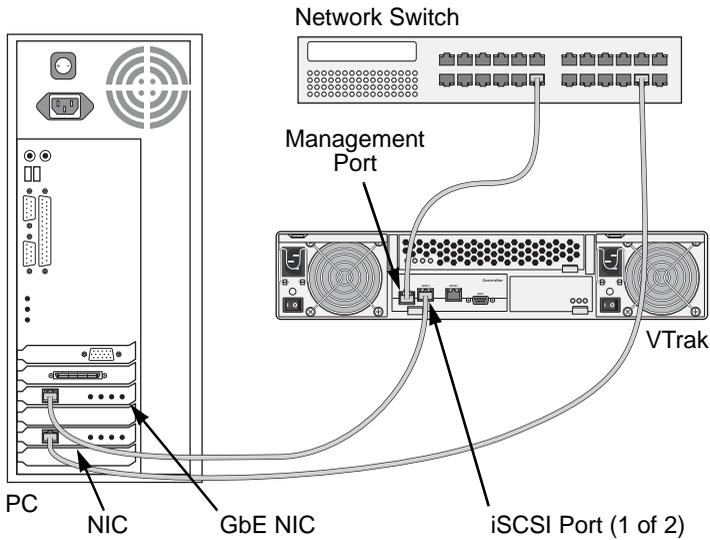


Figure 11. VTrak M300i and M200i DAS connections (M500i is similar)

This arrangement requires:

- A Gigabit Ethernet network interface card (GbE NIC) with iSCSI support (in hardware or software)
- A network switch
- A network interface card (NIC) in the PC

Connect the GbE (iSCSI) NIC in your PC to one of the VTrak Data Ports to establish an isolated data path.

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

SCSI Direct Attached Storage

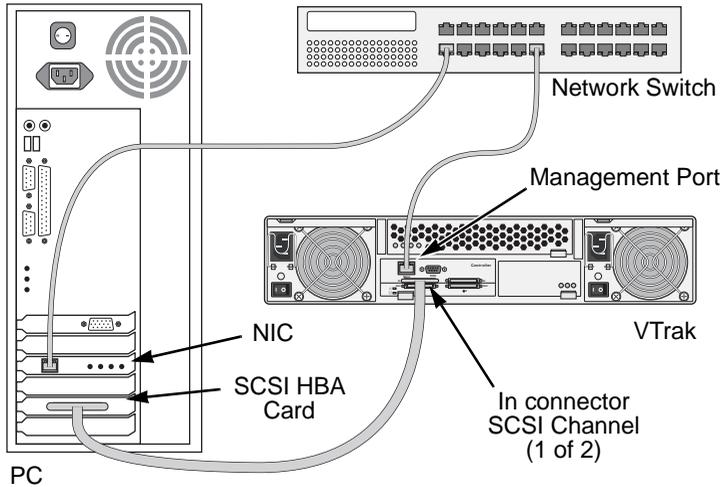


Figure 12. VTrak M300p and M200p DAS connections (M500p is similar)

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 "SCSI Channel Settings" on page 95 or "Channel Settings" on page 198 for more information about the internal termination feature.

Set Up Serial Cable Connections

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

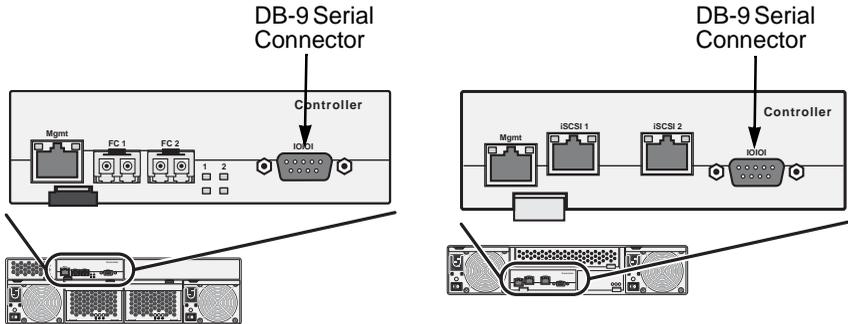


Figure 13. Serial connectors for VTrak M500f (left) and M300i (right)

Connect the Power

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

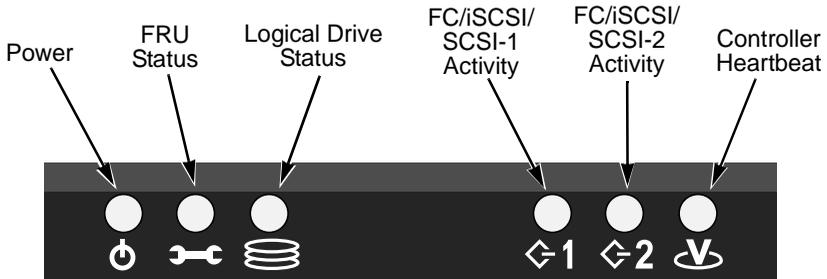


Figure 14. VTrak M500f/i/p front panel LED display

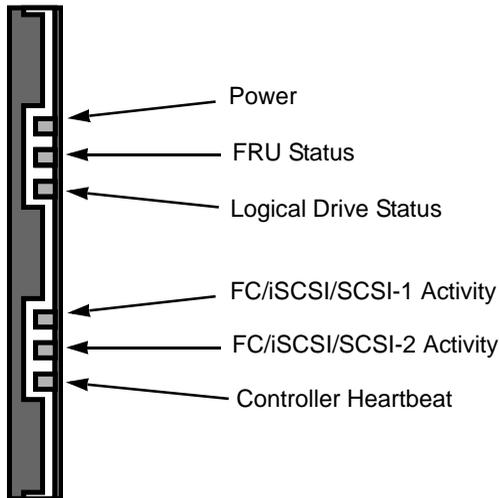


Figure 15. VTrak M300f/i/p and M200f/i/p front panel LED display

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

- Controller LED blinks green once per second for five seconds, goes dark for ten seconds, then blinks green once per second for five seconds again.
- Power, FRU and Logical Drive LEDs display green continuously.
- Fibre Channel/iSCSI/SCSI LEDs flash green if there is activity on that channel.

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.

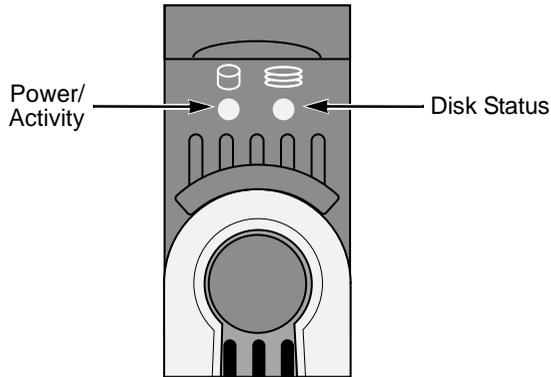


Figure 16. VTrak M500f/i/p drive carrier LEDs

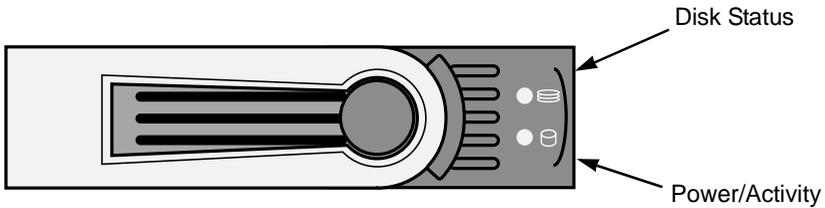


Figure 17. VTrak M300f/i/p and M200f/i/p drive carrier LEDs

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 29.

Chapter 3: Setup

- VTrak Setup with CLI or CLU (below)
 - Install iSCSI Initiator on the Host PC (page 39)
 - VTrak Setup with WebPAM PROe (page 41)
-

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 57 and the CLU on page 157.

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 settings to match the following:
 - 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: Fibre Channel and SCSI Models (M500f/p, M300f/p, M200f/p) (page 30)
- CLI: iSCSI Models (M500i, M300i, M200i) (page 30)
- CLU: Fibre Channel and SCSI Models (M500f/p, M300f/p, M200f/p) (page 32)
- CLU: iSCSI Models (M500i, M300i, M200i) (page 34)

CLI: Fibre Channel and SCSI Models (M500f/p, M300f/p, M200f/p)

1. Type the following string to set the Date and Time, then press Enter

```
administrator@cli> date -a mod -d 2005/06/08 -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 8, 2005. 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.

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 41.

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

CLI: iSCSI Models (M500i, M300i, M200i)

1. Type the following string to set the Date and Time, then press Enter

```
administrator@cli> date -a mod -d 2005/06/08 -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 8, 2005. 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.

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
```

```
=====
Cld Port Type  IP           Mask          Gateway       Link
=====
1  1    Mgmt  192.168.10.87 255.255.255.0 192.168.10.3  Up
1  1    iSCSI 0.0.0.0       0.0.0.0       0.0.0.0       Down
1  2    iSCSI 0.0.0.0       0.0.0.0       0.0.0.0       Down
```

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

```
administrator@cli> net -a mod -t iSCSI -p 1 -s
"primaryip=192.168.10.88, primaryipmask=255.255.255.0,
gateway=192.168.10.3"
```

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 iSCSI -p 1 -s "dhcp=enable"
```

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

```
administrator@cli> net
```

```
=====
Cld Port Type  IP           Mask          Gateway       Link
=====
1  1    Mgmt  192.168.10.87 255.255.255.0 192.168.10.3  Up
1  1    iSCSI 192.168.10.88 255.255.255.0 192.168.10.3  Up
1  2    iSCSI 0.0.0.0       0.0.0.0       0.0.0.0       Down
```

6. Repeat steps 3 and 4 to set the other iSCSI port. Use **-p 2** in place of **-p 1**.

This completes the Management and iSCSI port setup. Go to “Install iSCSI Initiator on the Host PC” on page 39.

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

CLU: Fibre Channel and SCSI Models (M500f/p, M300f/p, M200f/p)

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 *Enabled*.

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 41.

CLU: iSCSI Models (M500i, M300i, M200i)

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
iSCSI 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 settings are displayed (above).

3. Record the information on this screen.
4. Press the spacebar to toggle DHCP back to *Enabled*.
5. Press Ctrl-A to save these settings and move to the iSCSI Port 1 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 and move to the iSCSI Port 1 screen.

iSCSI Ports

```

Promise M-Series | Quick Setup [Step 3 of 6]: iSCSI Port 1
Port ID       : 1                IP Type      : IPv4
Port Status   : Enabled          MAC Address   : 00:07:E9:1A:18:63
Link Status   : Up              Max Supported Speed : 1000Mbps

DHCP          : Enabled

TCP Port Number [1-65535] : 3260

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 iSCSI Port settings manually, or to view the current settings, you must disable DHCP.

To view the current iSCSI Port settings:

1. Press the arrow keys to highlight *DHCP*.
2. Press the spacebar to toggle to *Disabled*.
3. Record the information on this screen.
See the illustration on the next page.
4. Press the spacebar to toggle DHCP back to *Enabled*.
5. Press Ctrl-A to save these settings and move to the iSCSI Port 2 screen.
6. Follow the same procedure to view settings for iSCSI Port 2.
7. Press Ctrl-A to save these settings and move to the RAID configuration screen.

```
Promise M-Series | Quick Setup [Step 3 of 6]: iSCSI Port 1
Port ID      : 1                IP Type      : IPv4
Port Status  : Enabled          MAC Address   : 00:07:E9:1A:18:63
Link Status  : Up              Max Supported Speed : 1000Mbps

DHCP         : Disabled
IP Address   : 10.0.10.126
Subnet Mask  : 255.0.0.0
Gateway IP Address : 10.0.10.126

TCP Port Number [1-65535] : 3260

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

The current iSCSI Port settings are displayed (above).

To make iSCSI 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. Repeat the previous steps 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 and move to the iSCSI Port 2 screen.
8. Follow the same procedure to make settings for iSCSI Port 2.
9. 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 and iSCSI port setup. Go to “Install iSCSI Initiator on the Host PC” on page 39.

Install iSCSI Initiator on the Host PC

This step applies to the M500i, M300i, and M200i models only.

To access the iSCSI data ports, you must have the iSCSI Initiator installed on your Host PC. You can use a Gigabit Ethernet network interface card (GbE NIC) with hardware-based iSCSI initiator from such vendors as:

- QLogic
- Intel
- Alacritech

Contact the card manufacturer for the latest model information. Follow the installation and setup instructions that come with the card.

Software-based iSCSI Initiator

You can also use a software-based iSCSI initiator in combination with a GbE NIC. If you choose a Microsoft software iSCSI initiator, point your browser to **www.microsoft.com**, click on the **Downloads** link, and search for **iSCSI Initiator**. The instructions below apply to iSCSI Initiator version 2.0.

Install the iSCSI initiator on your Host PC then proceed with the following steps.

1. Go to Start > Settings > Control Panel, and double-click on iSCSI Initiator. Or double-click the iSCSI Initiator icon on the desktop. The iSCSI Initiator Properties dialog box displays.
2. On the Discovery tab, click on **Add** button.
3. In the Add Target Portal dialog box, type in the IP address of one of the VTrak's iSCSI ports and click **OK**.
4. Go to Targets tab. The iSCSI name should appear. It looks like:
iqn.1994-12.com.promise.target.0.0.4.0.0.0.0.0.
5. Highlight the iSCSI name and click the **Logon** button. Then click **OK** on the Log On to Target dialog box.

To log off from VTrak, do the following:

1. Launch the iSCSI Initiator as described above.
2. Go to the Targets tab, highlight the VTrak iSCSI name, and click the **Details** button.
3. Go to the Sessions tab of the Target Properties dialog box. The Identifier for the iSCSI name should appear. It looks like:
ffffff817b0494-4000013700000007
4. Check the box to the left of the Identifier, click the **Log off...** button, then click the **OK** button.

After the iSCSI Initiator is installed, follow the installation and setup instructions that come with your GbE NIC card.



Note

Setup of an actual iSCSI initiator takes place after the disk array and logical drive are configured on the VTrak. If you plan to use LUN Masking, enable this feature and specify your LUNs before setting up your iSCSI initiator.

See “Chapter 4: Management with WebPAM PROe” on page 57 and “Chapter 5: Management with the CLU” on page 157 for more information.

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 157 for more information.
- The WebPAM PROe software is embedded on the VTrak M-Class subsystem. No installation is required.

Set up with WebPAM PROe consists of the following:

- Log-in to WebPAM PROe (below)
- Language Selection (page 44)
- Create a Disk Array (page 45)
- Additional Logical Drives (page 54)
- Log-out of WebPAM PROe (page 54)
- Internet Connection using WebPAM PROe (page 55)

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 connectionhttp://
- 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 connectionhttps://
- Enter the VTrak's Management Port IP address 192.168.10.87

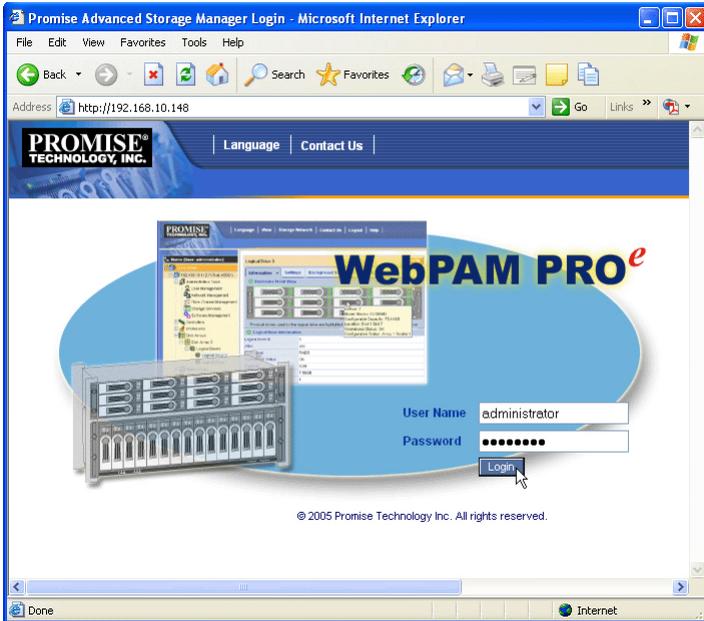
Together, your entry looks like this:

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 45).



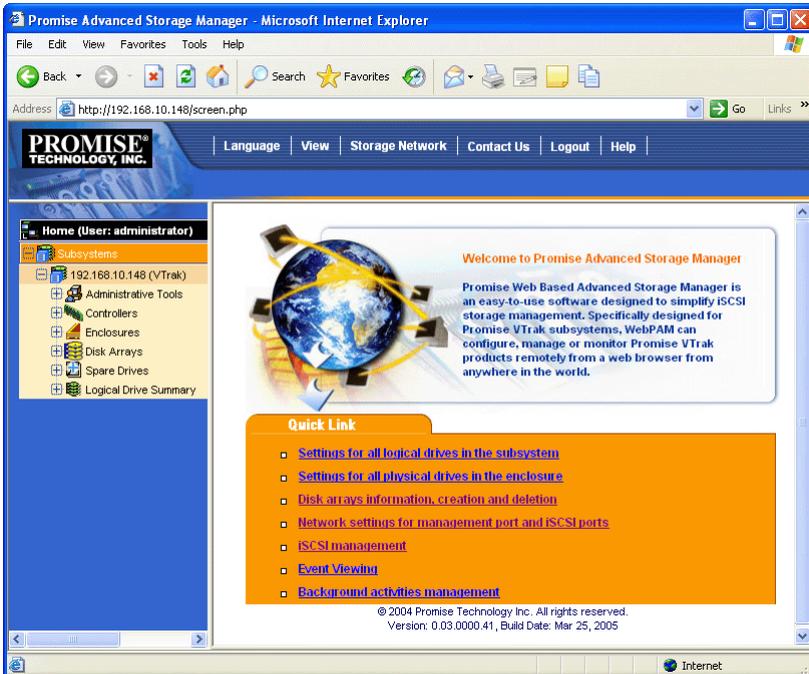
Important

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.

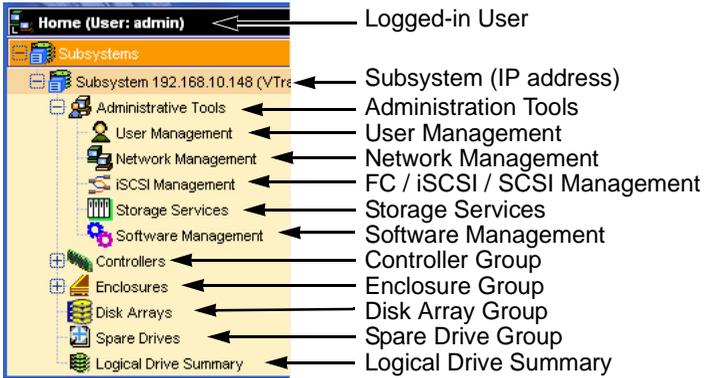


Note

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 PROe, there will be no Users except for “administrator”. Unless you created disk arrays or logical drives in the CLI or CLU, there will be no disk arrays or logical drives at this point.



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.

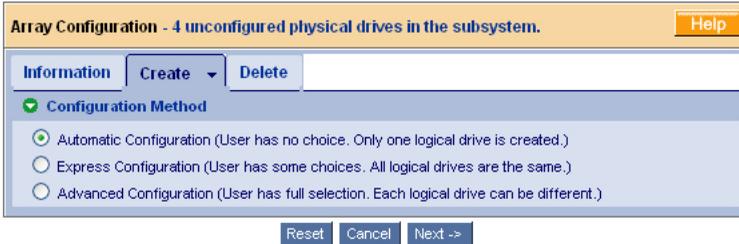
Language Selection

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.



#	RAID Level	Capacity	Stripe	Sector	Read Policy	Write Policy
1	RAID5	100.58GB	64KB	512Bytes	ReadAhead	WriteBack

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 48) 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 type="text" value="1"/>	Max: 32
Application Type	<input type="text" value="File Server"/>	
Automatic Update	<input checked="" type="checkbox"/>	<input type="button" value="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.		

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.

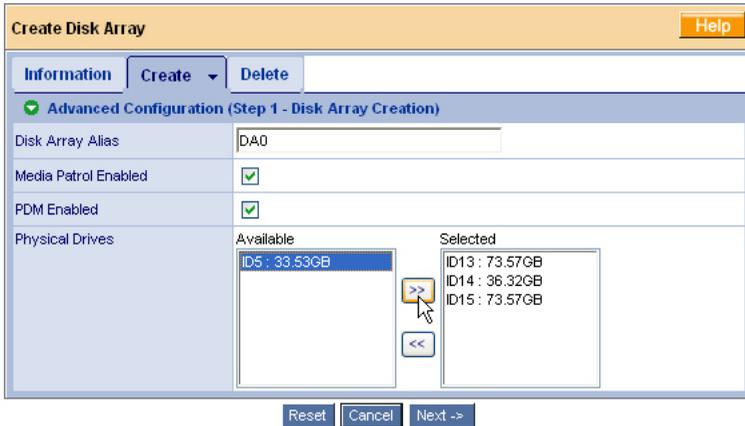
5. When you are done, click the **Submit** button.
- The new disk array appears in the Disk Array List on the Information tab.

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 239.

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: LD0

RAID Level: RAID0

Capacity: 50 GB Maximum: 108.96GB

Stripe: 64KB

Sector: 512Bytes

Read Policy: ReadAhead

Write Policy: WriteBack

Update Delete

Capacity Usage

Free Capacity

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.

Create Disk Array
Help

Information
Create ▾
Delete

✓ Advanced Configuration (Step 2 - Logical Drive Creation)

Alias	LD1
RAID Level	RAID0 ▾
Capacity	50 GB Maximum: 58.96GB
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
1	LD0	RAID0	50GB	64KB	512Bytes	ReadAhead	WriteBack

<- Back
Cancel
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	LD1
RAID Level	RAID0 ▾
Capacity	50 GB ▾ Maximum: 58.96GB
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
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

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

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

#	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

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

- 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 48).

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 45).

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 Fibre Channel, iSCSI, or 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 59)
- Audible Alarm (page 60)
- Log-in/Log-out (page 61)
- Graphic User Interface (page 64)
- Subsystems (page 68)
- Administrative Tools (page 75)
- Controllers (page 113)
- Enclosures (page 117)
- Physical Drives (page 122)
- Disk Arrays (page 128)
- Logical Drives (page 141)
- Spare Drives (page 150)

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.

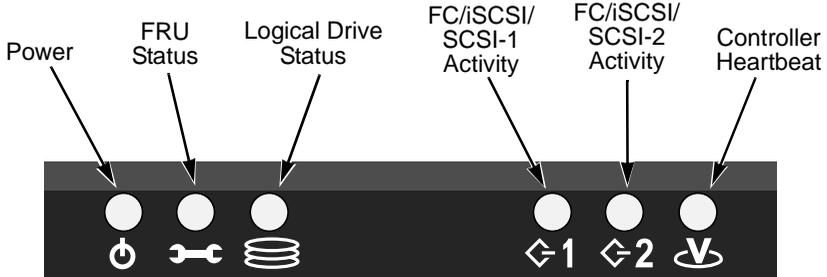


Figure 1. VTrak M500f/i/p front panel LED display

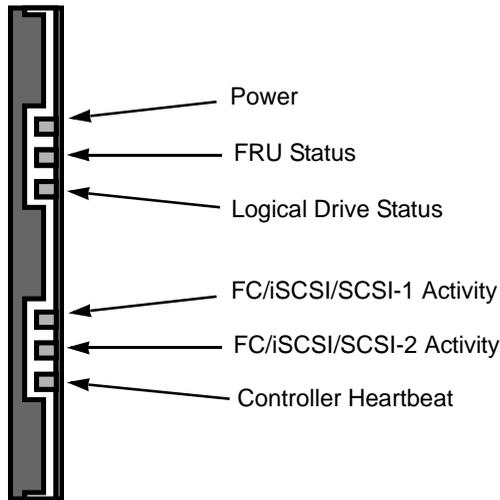


Figure 2. VTrak M300f/i/p and M200f/i/p front panel LED display

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

- Controller LED blinks green once per second for five seconds, goes dark for ten seconds, then blinks green once per second for five seconds again.
- Power, FRU, and Logical Drive LEDs display green continuously.
- Fibre Channel/iSCSI/SCSI LEDs flash 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	n/a	n/a	n/a
FRU*	System Off	Normal	n/a	Fan or Battery Problem	Fan or Battery Failed
Logical Drive	System Off	Normal	n/a	Logical Drive Critical	Logical Drive Offline
FC/iSCSI/SCSI 1 or 2	No Activity	n/a	Activity	n/a	n/a
Controller	System Off	n/a	Normal**	n/a	n/a

“n/a” means this state does not apply to this LED.

* Field Replacement Unit. “n/a” means this state does not apply to this LED.

** Blinks five times in five seconds, five seconds dark, blinks five times again.

See page 215 for more information about field-replaceable components.

See page 286 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.

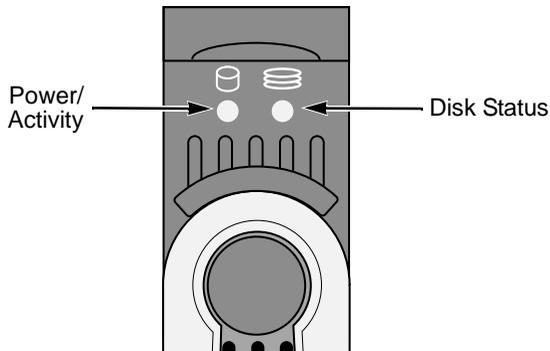


Figure 3. VTrak M500f/i/p disk carrier LEDs

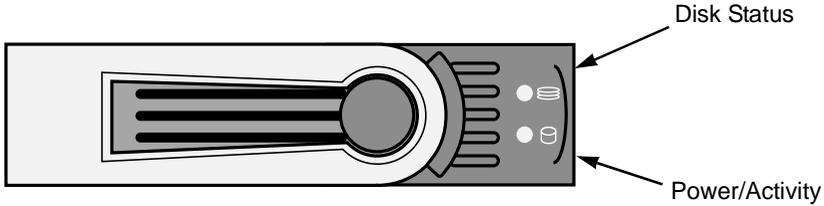


Figure 4. VTrak M300f/i/p and M200f/i/p disk carrier LEDs

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.

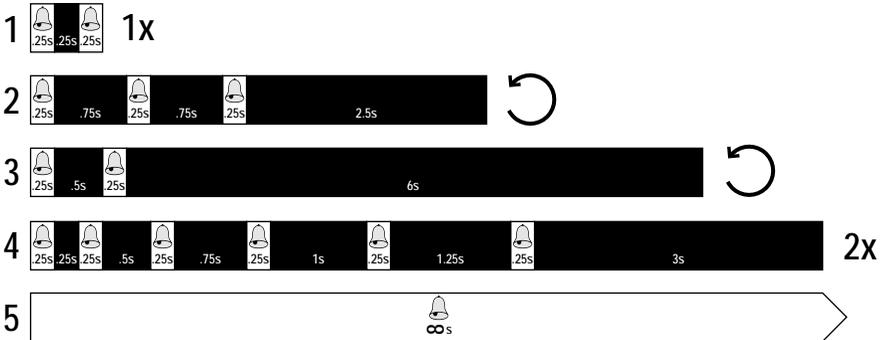
LEDs	State				
	Dark	Steady Green	Flashing Green	Amber	Red
Power/Activity	No Drive	Drive Present	Activity	n/a	n/a
Status	No Power/No Drive	Drive OK	n/a	Drive Rebuilding	Drive Error

“n/a” means this state does not apply to this LED.

See “Critical & Offline Disk Arrays” on page 286 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, do the following:

- 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 67).

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

See “Chapter 8: Troubleshooting” on page 261 for diagnostic help.

To make alarm settings, see “Buzzer” on page 121.

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 29.

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

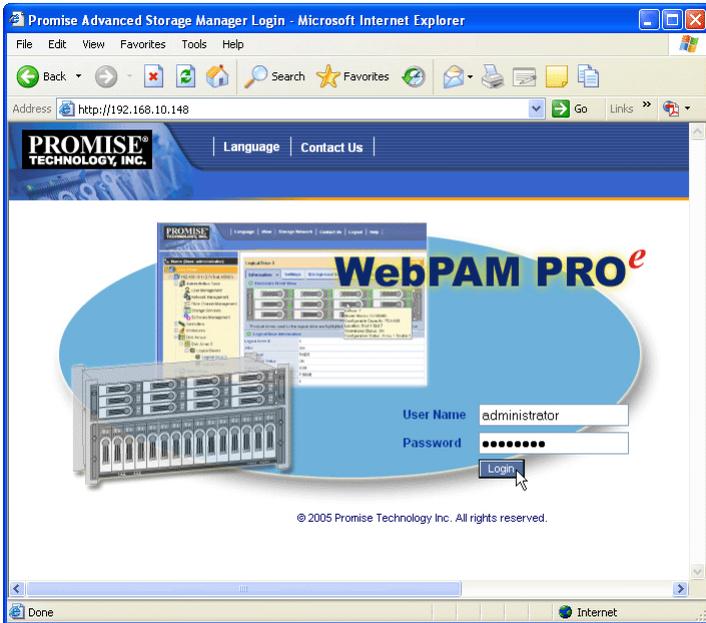
Together, your entry looks like this:

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.



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.

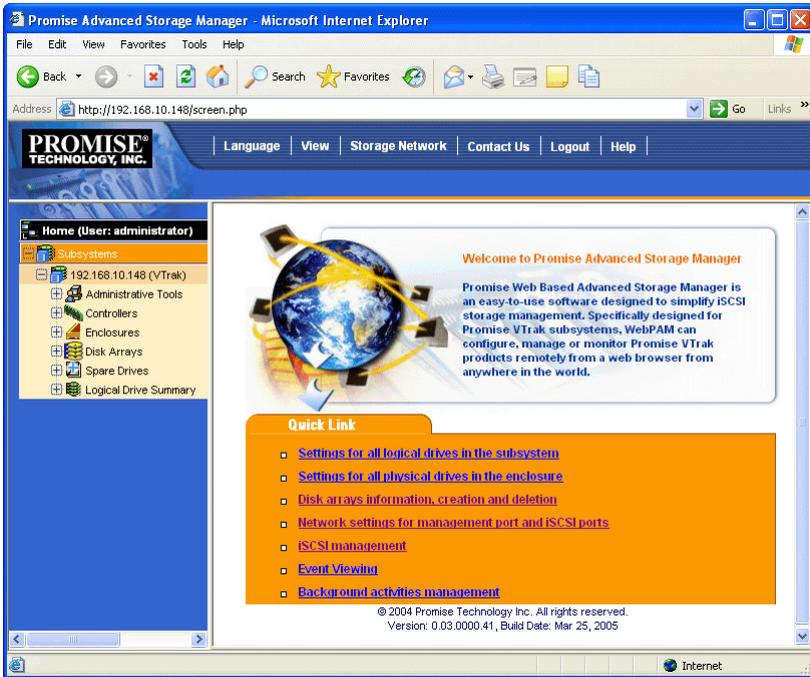


Figure 5. WebPAM PROe Opening Screen

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 29) 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 65)
- Management Window (page 68)
- Tree View (page 67)
- Event Frame (page 68)

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



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 iSCSI 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.

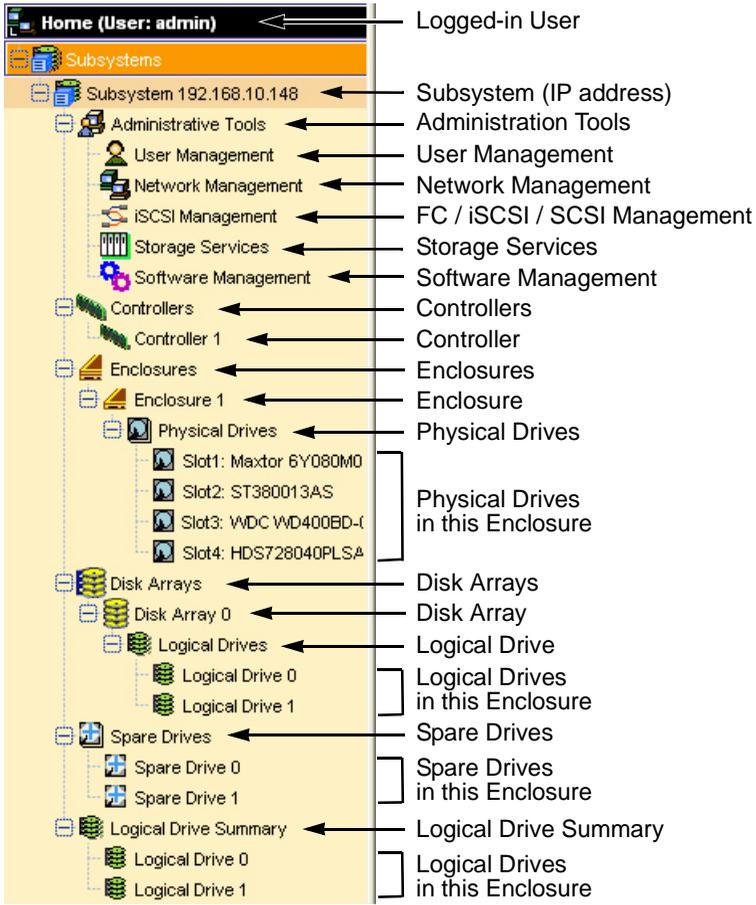
Contact Us

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 299.

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 77.
- 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 77.
- 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 138
- Disk Array Synchronization. See “Logical Drive Synchronization” on page 146
- Logical Drive Initialization. See “Logical Drive Initialization” on page 145
- Disk Array Migration. See “Disk Array Migration” on page 137
- Disk Array Transition. See “Transition” on page 140
- Logical Drive Redundancy Check. See “Logical Drive Redundancy Check” on page 146
- Predictive Data Migration (PDM). See “Logical Drive PDM” on page 147
- Error and Reassigned Block Thresholds (to trigger PDM. See Block Threshold Definitions, below)
- Media Patrol. See “Physical Drive Media Patrol” on page 128

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 257.
 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 253.
 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 128
- Redundancy Check. See “Logical Drive Redundancy Check” on page 146
- Battery Reconditioning. See “Battery Recondition” on page 121
- Spare Drive Check. See “Spare Check – All Spare Drives” on page 152

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 75
- Network Management. See page 81
- Fibre Channel Management. See page 83
- iSCSI Management. See page 88
- SCSI Management. See page 95
- Storage Services. See page 97
- SNMP Management. See page 104
- Web Server Setting. See page 102
- Email Setting. See page 100
- Telnet Setting. See page 103
- CIM Setting. See page 106
- Netsend. See page 107
- Export File. See page 109
- Import File. See page 109
- Download Firmware/Software. See page 110
- Restore Factory Defaults. See page 110
- Clear Statistics. See page 111
- Shutdown. See page 111

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 80
7. Click the **Submit** button.

The Administrator or Super User can change another user’s password. See “User Password – Administrator” on page 79 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 100.

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)
 - Storage Enclosure Processor (SEP)
- 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 79.
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, and on iSCSI models, the network connections to the iSCSI Data Ports.

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 the following:

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

iSCSI Data Ports

The Network Management–iSCSI tab enables you to see the current Data 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
- Primary MAC address
- Maximum speed supported by this connection
- TCP port number (3260 is the default)

To make changes to the Data 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 or Port 2 link in Management View.
5. To enable DHCP, check the DHCP box.

When DHCP is NOT enabled, enter the following:

- Primary IP address
 - Primary subnet mask
 - Default gateway IP address
 - Enter a TCP port number (3260 is the default).
6. Click the **Submit** button.

Fibre Channel Management

This feature pertains the VTrak Fibre Channel models, M500f, M300f, and M200f.

Fibre Channel Node

The Fibre Channel Management–Node tab enables you to see the current Data Port settings on the Controller, including:

- Hardware Version

- Firmware Version
- Number of failed nodes
- Supported Features
- Maximum Frame Size
- Supported Speeds

To access this tab:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the Fibre Channel Management  icon.
4. Click the Node tab in Management View.

Fibre Channel Port

The Fibre Channel Management–Port tab enables you to see the current Data Port settings on the Controller, including:

- State – Online, Offline, Unknown
- Port Identifier – A hexadecimal name for this port
- Topology Attached – Fabric Direct, Fabric Loop, Unknown
- WWNN – World Wide Node Name
- WWPN – World Wide Port Name
- Current Speed – 2 GB or 1 GB
- Link Type – Long-wave laser, short-wave laser or electrical
- Symbolic Name – A text name for this port
- Configured Link Speed
- Configured Topology
- Hard ALPA – Address can be 0 to 254. 255 means this feature is disabled

To access this tab:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the Fibre Channel Management  icon.
4. Click the Port tab in Management View

Fibre Channel Port Settings

The Fibre Channel Management–Port tab enables you to make Data Port settings on the Controller, including:

- Configured Link Speed – 2 GB, 1 GB or Auto (self-setting)

- Configured Topology – N-Port (Point-to-Point), NL Port (Arbitrated Loop) or Auto (self-setting)
- Hard ALPA – Address can be 0 to 254. 255 means this feature is disabled. An ALPA identifies a port in an arbitrated loop.

To access this tab:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the Fibre Channel Management  icon.
4. Click the Port tab in Management View
5. Click the **Port1** or **Port2** link in Management View.

The table below shows the type of attached topology you will achieve based on your connection type and the configured topology you select:

Fibre Channel Attached Topology		
	Configured Topology	
Connection Type	N-Port	NL-Port
Switch	Fabric Direct	Public Loop
Direct	Point to Point	Private Loop

Example 1: If you connect the VTrak to a Fibre Channel switch and select NL-Port topology, you will create a Public Loop attached topology.

Example 2: If you have a Point to Point attached topology, you made a direct connection (no switch) and selected N-port topology.



Note

In some cases, HBA settings to N-Port only work if connected to the switch. Refer to your HBA manual for more information.

Fibre Channel Statistics

The Fibre Channel Management–Statistic tab enables you to view statistics of the Ports on the Controller, including:

- Time since last reset
- Number of frames sent
- Number of frames received

- Number of words sent
 - Number of words received
 - LIP Count – Loop initialization primitive count
 - NOS Count – Not operational primitive sequence count
 - Number of error frames
 - Number of dumped frames
 - Link Failure Count
 - Loss Sync Count
 - Loss Signal Count
 - Primitive Sequence Error Count
 - Invalid Word Sent Count
 - Invalid CRC Count
 - Initiator IO Count
1. Click the Subsystem  icon in Tree View.
 2. Click the Administrative Tools  icon.
 3. Click on the Fibre Channel Management  icon.
 4. Click the Statistic tab in Management View.

Fibre Channel SFP

The Fibre Channel Management–SFP tab enables you to view information about the SFPs (small form-factor pluggable transceivers) on the Controller, including:

- Connector – Type of connector
- Transceiver – SFP
- Transceiver Code – Defines the method to interpret the transceiver type and compatibility options
- Serial Encoding – Serial encoding algorithm
- Bit Rate – In gigabits per second
- Link Length – The maximum link length depending on the type of fiber
- Vendor Name – Vendor name of the SFP transceiver
- Vendor OUI – Organizational Unique Identifier, SFP vendor's IEEE company ID
- Vendor Part Number
- Vendor Revision
- Vendor Serial Number
- Manufacturing Date – Code with 2 digits each for year, month, day, and optional vendor-specific lot number

To access this tab:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the Fibre Channel Management  icon.
4. Click the SFP tab in Management View

Fibre Channel Logged-in Devices

The Fibre Channel Management–Logged In Device tab enables you to view information about the logged-in devices on the two Fibre Channel ports, including:

- # – Device number
- WWPN – World Wide Port Name
- Port ID – ID of the device, not the Fibre Channel port
- Symbolic Name – If used

One of the devices in the list for each port will be the port itself. If there is no other device, this notification will appear: There is no logged in device. If a Fibre Channel switch is attached, it will also appear in this list.

To access this tab:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the Fibre Channel Management  icon.
4. Click the Logged In Device tab in Management View

Fibre Channel Initiators

The Fibre Channel Management–Initiator tab enables you to view information about the initiators on the two Fibre Channel ports, including:

- # – Device number
- WWPN – World Wide Port Name
- Port ID – ID of the initiator, not the Fibre Channel port
- Symbolic Name – If used

A Fibre Channel switch will also display as an initiator in the list. If your Host PC's Fibre Channel HBA is connected to the VTrak directly (not through a Fibre Channel switch), the initiator will NOT display in the initiator list.

To access this tab:

1. Click the Subsystem  icon in Tree View.

2. Click the Administrative Tools  icon.
3. Click on the Fibre Channel Management  icon.
4. Click the Initiator tab in Management View.

To add or delete an initiator, see “Storage Services” on page 97.

iSCSI Management

This feature pertains the VTrak iSCSI models, M500i, M300i, and M200i.

A detailed explanation of these iSCSI functions, how and when they are used, and their relationship to one another is beyond the scope of this document. For more information, contact the Internet Engineering Task Force at <http://www.ietf.org/>.

iSCSI Node

The iSCSI Management–iSCSI Node tab enables you to see the current Data Port settings on the Controller, including:

- Maximum number of nodes supported
- Number of nodes present
- Number of failed nodes
- Node ID
- Node Name – An iSCSI node is identified by its name.
- Node Alias – Maximum of 32 characters. Use letters, numbers, space between words, and underscore. An alias is optional.
- Max outstanding R2T – Sets the maximum number of outstanding ready to transfer PDUs (a number).
- Maximum burst length – Maximum length of a solicited data sequence (512 b to 16 Mb).
- Maximum number of connections – Maximum number of connections supported.
- Default time to wait – After a dropped connection, the number of seconds to wait before attempting to reconnect.
- Default time to retain – Number of seconds after time to wait (above) before reassigning outstanding commands.
- Error recovery level – Error recovery level supported.
- Initial R2T – Allows initiator to begin sending data to a target without receiving a ready to transfer command.
- Header Digest – Enables the use of Header Digest (CRC). See note below.
- Data Digest – Enables the use of a Data Digest (CRC). See note below.
- Data PDU in order – Enables placement of data in PDU order.

- Data sequence in order – Enables placement of data in sequence order.
- Uni-directional CHAP Authentication – Enables Challenge Handshake Authentication Protocol.
- Bi-directional CHAP Authentication – Enables bi-directional and uni-directional CHAP authentication.

To make changes to the Data Port settings:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the iSCSI Management  icon.
4. Click the **iSCSI Node 1** link in Management View.
5. Type an alias in the Alias field.
Maximum of 32 characters. Use letters, numbers, space between words, and underscore. An alias is optional.
6. Enter the values in the fields as required
7. Check the boxes to enable features as required.
8. Click the **Submit** button.



Notes

Header Digest and Data Digest work best with initiators equipped with a TCP Offload Engine (TOE). Refer to your iSCSI HBA user manual for more information.

For iSCSI network settings on the Data Ports, click on the Network Management icon, then click on the iSCSI Network tab

iSCSI Ports

The iSCSI Management–Portal tab enables you to see the current Data Port settings. To access to the iSCSI Management–Portal tab:

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

Information (in GUI order):

- Controller ID – (1).
- Port ID – (1 or 2).
- Max Receive Data Segment Length – (512 KB is the default).
- Number of Active Sessions – (Number of sessions logged into this port).

- Primary Header Digest Method – (None).
- Primary Data Digest Method – (None).
- iSCSI Receive Marker – (None).

iSCSI Port Statistics

The iSCSI Management–Portal tab, Port Statistics dropdown menu enables you to see the current Data Port statistics. To access to the iSCSI Management–Ports tab:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the iSCSI Management  icon.
4. Click the Portal tab dropdown menu in Management View and select Port Statistics.

Statistics (in GUI order):

- Controller ID – VTrak Controller ID.
- Port ID – VTrak Controller Port ID.
- MAC Counts
 - Transmitted Frames
 - Transmitted Bytes
 - Received Frames
 - Received Bytes
 - CRC Errors
 - Encoding Errors
- IP Counts
 - Transmitted Packets
 - Transmitted Bytes
 - Transmitted Fragments
 - Received Packets
 - Received Bytes
 - Received Fragments
 - Received Datagram Reassemblies
 - Received Packet Errors
 - Datagram Reassembly Time-outs
 - Fragments received out-of-order
 - Fragments received overlapped
- TCP Counts

- Transmitted Segments
- Transmitted Bytes
- Received Segments
- Received Bytes
- Retransmit Timer Expire
- Persist Timer Expired
- Received Pure ACKs
- Received Duplicate ACKs
- Transmitted Pure ACKs
- Transmitted Duplicate ACKs
- Received Segments out-of-order
- Received Segment Errors
- Received Window Updates
- Received Window Probes
- iSCSI Counts
 - Transmitted PDUs
 - Transmitted Data Bytes
 - Received PDUs
 - Received Data Bytes
 - I/O Comp Bytes
 - Unexpected I/O received
 - Format Errors
 - Header Digest Errors
 - Data Digest Errors
 - Sequence Errors

iSCSI Sessions

The iSCSI Management–Sessions tab lists the current iSCSI sessions on the Data Ports. The window displays session information. Click the Statistics link to see session statistics. To access to the iSCSI Management–Sessions tab:

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

The window displays session information.

iSCSI iSNS

The iSCSI Management–iSNS tab enables you to view and change the current iSNS settings on the Controller data ports. Internet Storage Name Service (iSNS) is a protocol used to facilitate the automated discovery, management, and configuration of iSCSI and Fibre Channel devices on a TCP/IP network.

- iSNS port ID number (1 or 2)
- iSNS status. Enabled or disabled
- ESI status. Enabled or disabled
- Get iSNS IP through DHCP. Yes or No
- iSNS Server IP address
- iSNS Server Port number (3205 for most applications)



Note

Edge Side Includes (ESI) is a markup language that enables dynamic assembly of web page elements in servers across a network. This feature enables automatically if iSNS is enabled and an iSNS server is present.

To make changes to the iSNS settings:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the iSCSI Management  icon.
4. Click on the iSNS tab in Management View.
5. Click the **iSNS Port 1** or **iSNS Port 2** link.
6. Check the box to enable iSNS.
7. Enter the iSNS server IP address.
8. Enter a new iSNS Port number if required.
9. Click the **Submit** button.



Notes

To see the current iSNS initiator nodes, click on the iSNS tab dropdown menu, and select *Get Initiators*. You might have to wait until the iSNS server updates the initiator list.

To see the current iSNS target nodes, click on the iSNS tab dropdown menu and select *Get Targets*. You might have to wait until the iSNS server updates the target list.

iSCSI SLP

The iSCSI Management–SLP tab enables you to view and change the current settings on the Controller data ports. Service Location Protocol (SLP) is a standard used to discover services over the Internet. It includes Service Agents (SA) that advertise services, and a Directory Agent (DA) that gathers and organizes the data for queries.

- Port ID – (1 or 2)
- SLP status – Enabled or Disabled
- Use Directory Agent – Yes or No

To make changes to the SLP settings:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the iSCSI Management  icon.
4. Click on the SLP tab in Management View.
5. Click the SLP Port 1 or SLP Port 2 link.
6. Check the box to enable SLP.
7. Check the box to enable Use Directory Agent.
8. Choose one of the following:
 - Check the box to enable Get Directory Agent IP Through DHCP.
The Use Directory Agent box must be checked.
 - Or enter a DA IP address in the field provided.
The Use Directory Agent box must be checked.
The Get Directory Agent IP Through DHCP box must be UNchecked.
9. Click the **Submit** button.

iSCSI CHAP

The iSCSI Management–CHAP tab displays the current CHAP settings. Challenge Handshake Authentication Protocol (CHAP) is an authentication agent (typically a network server) sends the client program a random value and an ID value. Both the sender and peer share a predefined secret. The peer concatenates the random value, the ID, and the secret and calculates a one-way hash value. The hash value is sent to the authenticator, which in turn builds that same string on its side, calculates the sum, and compares the result with the value received from the peer. If the values match, the peer is authenticated.

View CHAPs

To view the current CHAPs:

1. Click the Subsystem  icon in Tree View.

2. Click the Administrative Tools  icon.
3. Click on the iSCSI Management  icon.
4. Click on the CHAP tab in Management View.

Add a CHAP

To add a new CHAP:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the iSCSI Management  icon.
4. Click on the CHAP tab in Management View.
5. Click on the CHAP tab dropdown menu and select *Add CHAP*.
6. Enter a name in the Name field.
7. Enter a secret of 16 or more characters in the Secret field.
8. Enter the secret again in the Retype Secret field.
9. Select the CHAP type.
Peer to peer is one-way authentication. Local is bi-directional authentication.
10. Click the **Submit** button.

Edit a CHAP

To edit a CHAP:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the iSCSI Management  icon.
4. Click on the CHAP tab in Management View.
5. Click on the CHAP name link.
6. Enter a name in the Name field.
7. Enter a secret of 16 or more characters in the Secret field.
8. Enter the secret again in the Retype Secret field.
9. Select the CHAP type.
Peer to peer is one-way authentication. Local is bi-directional authentication.
10. Click the **Submit** button.

Delete a CHAP

To delete a CHAP:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.

3. Click on the iSCSI Management  icon.
4. Click on the CHAP tab in Management View.
5. Click on the CHAP tab dropdown menu and select *Delete CHAP*.
6. Check the box to the left of the CHAP you want to delete.
7. Click the **Submit** button.

iSCSI Ping

The iSCSI Management–Ping tab enables you to verify a network connection through VTrak’s iSCSI data ports.

To send a ping:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the iSCSI Management  icon.
4. Click on the Ping tab in Management View.
5. Enter the IP address you want to ping in the IP Address field.
6. Select the data port (1 or 2) from the Ping Through Port dropdown menu.
7. Click the **Submit** button.

After a few moments, the result displays in the iSCSI Ping Operation header.

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 111.

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 95.

Storage Services

Storage Services include managing Initiator and LUN mapping. These functions are similar for Fibre Channel and iSCSI VTrak models, with a few minor differences in Initiator naming conventions, as noted below. Initiators do not apply to SCSI models. LUN Mapping is different for SCSI models.

Initiators

The Storage Services–Initiators tab enables you to add and delete initiators. This function applies to Fibre Channel and iSCSI VTrak models.

Add an Initiator

To add an initiator:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the Storage Services  icon.
4. Click the Initiators tab in Management View.
5. From the Initiators tab dropdown menu, select *Add Initiator*.
6. Enter the initiator's name in the Initiator Name field.

A Fibre Channel initiator name is the World Wide Port Name of the device and is composed of a series of eight, two-digit hexadecimal numbers.

An iSCSI initiator name is the iSCSI name of the initiator device and is composed of a single text string. iSCSI WWNs are somewhat different from regular WWNs.

Obtain the initiator name from the initiator utility on your host system.

Note that the initiator name you input must match exactly in order for the connection to work.

7. Click the **Submit** button.

Delete an Initiator

To delete an initiator:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the Storage Services  icon.
4. Click the Initiators tab in Management View.
5. From the Initiators tab dropdown menu, select *Delete Initiators*.
6. Check the box to the left of the initiator you want to delete.
7. Click the **Submit** button.

LUN Map – Fibre Channel and iSCSI

The Storage Services–LUN Map tab displays a list of initiators recognized by the VTrak controller and their corresponding LUN mapping.

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.

LUN Masking is the process of applying a LUN Map so that each initiator can only access the LUNs specified for it.

Enable LUN Masking

To enable the LUN Masking:

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.
5. Click the LUN Masking Enabled box.
6. Click the **Submit** button.

Edit a LUN Map

To edit the 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.
5. From the LUN Map tab dropdown menu, select Edit LUN Map.
6. Select an initiator from the Initiator dropdown menu.

Or enter the initiator's WWN in the Initiator Name field.

Obtain the initiator name from the initiator utility on your host system.

Note that the initiator name you input must match exactly in order for the connection to work.

7. Click the **Submit** button.

LUN Mapping Parameters

- Initiator – The Fibre Channel or iSCSI card in the Host system that initiates commands to the target (VTrak).
- Logical Drive ID – This is actually the disk array ID number.
- RAID Level – RAID Level of the logical drive.
- Capacity – Capacity of the logical drive.
- Serial Number – Serial number of the logical drive.
- WWN – World Wide Name, used for the Initiator name.

A Fibre Channel initiator name is the World Wide Port Name of the device and is composed of a series of eight, two-digit hexadecimal numbers.

An iSCSI initiator name is the iSCSI name of the initiator device and is composed of a single text string. iSCSI WWNs are somewhat different from regular WWNs.

- LUN – Logical Unit Number on this logical drive for the selected initiator.
You must enter different LUN numbers for each logical drive.

LUN Map – SCSI

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 95.

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 77.

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. CIM enables you to access VTrak's controller using a CIMOM browser.

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 106.

The default name is cim. You cannot change the name or add users.
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 217 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) though 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.

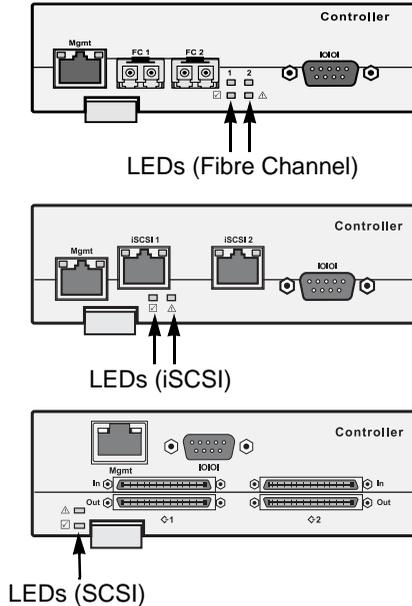


Figure 6. The Controller Status and Dirty Cache LEDs flash for one minute so you can identify the Controller

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 251.
- Cache Line Size – See "Cache Policy" on page 251
- Coercion – See "Capacity Coercion" on page 252
- Coercion Method – See "Capacity Coercion" on page 252
- 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 111.

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 252.
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 251.
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 252.
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, 2 in each cooling unit
- Number of physical drive slots – 15, 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.

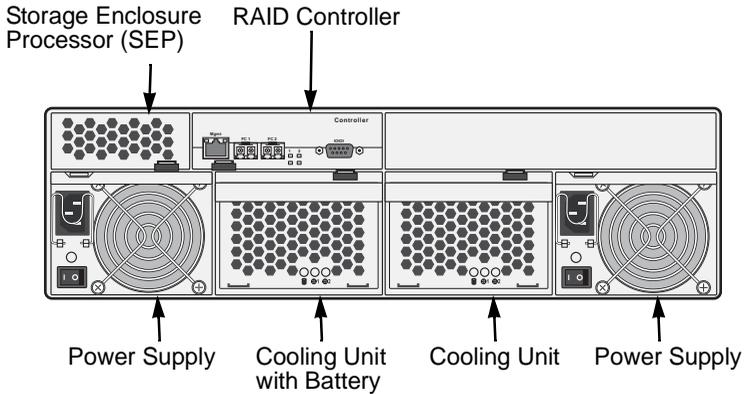


Figure 7. The VTrak M500f is show above, The M500i/p are similar.

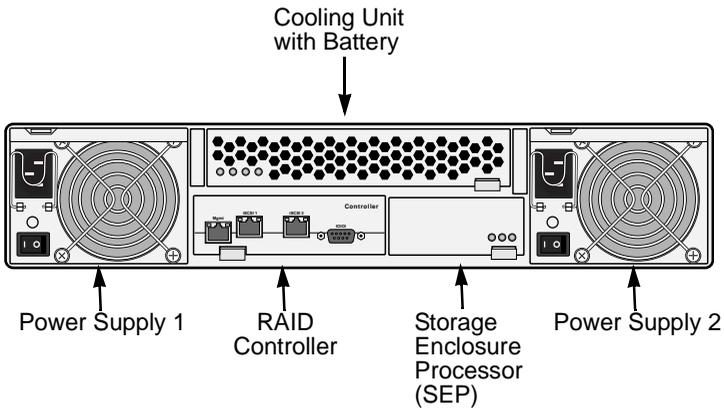


Figure 8. The VTrak M300i/M200i is shown above. The VTrak M300f/p and M200f/p are similar.

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 261.

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 (45°C is the default).
7. Enter a value in the Enclosure Critical Temperature Threshold field (51°C is the default).
8. Enter a value in the Controller Warning Temperature Threshold field (63°C is the default).
9. Enter a value in the Controller Critical Temperature Threshold field (68°C is the default).

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
- Storage Enclosure Processor (SEP)
- Battery Backup Unit (BBU)
- Cooling Units
- Power Supply Units
- Back Plane
- Controller Daughter Card Battery

Use this information when communicating with Technical Support and when ordering replacement units. For contact information, see “Contact Technical Support” on page 299.

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 230 and page 233 for more information.

Battery Recondition

VTrak automatically reconditions the battery every two months. To set the recondition schedule, see “Scheduler” on page 72.

To recondition the battery do the following:

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, do the following:

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, do the following:

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.

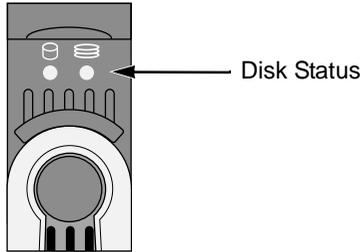


Figure 9. VTrak M500f/i/p disk carrier LEDs

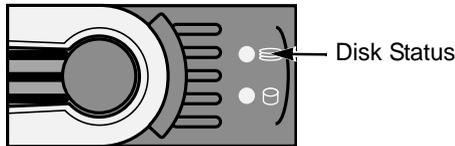


Figure 10. VTrak M300f/i/p and M200f/i/p disk carrier LEDs

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, Revertible Global Spare, Revertible 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.

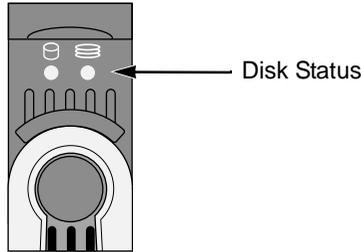


Figure 11. VTrak M500f/i/p disk carrier LEDs

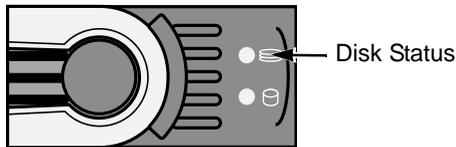


Figure 12. VTrak M300f/i/p and M200f/i/p disk carrier LEDs

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, do the following:

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 71.

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 the following:
 - 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 257.
7. Check the box if you want to enable PDM.
For more information, see “Predictive Data Migration (PDM)” on page 257.
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 axles for your array.
For more information on axles, see “RAID 50 – Striping of Distributed Parity” on page 245.
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 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 151.

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 247.
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 250.
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 250.
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 251.
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 251.
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 146.

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 of the following:

- Change the RAID Level
- Expand the storage capacity

For a list of Migration options and other important information, see “RAID Level Migration” on page 254.



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 71.

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 71.

To create a spare drive, see “Create Spare Drive” on page 151.

For more information, see “Hot Spare Drive(s)” on page 253.

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 71.

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 258.

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, do the following:

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 71.

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 the following:

- 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 135.

To delete a logical drive, see “Delete a Logical Drive” on page 137.

For a Degraded or Offline logical drive, see “Critical & Offline Disk Arrays” on page 286.

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 71.

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 71.

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 71.

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 257.

To run PDM, do the following:

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 71.

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 and 50, identified by the Redundancy Check (a background function).

Logical Drive LUN Settings: iSCSI and Fibre Channel

For iSCSI and Fibre Channel, LUN Masking is the process of applying a LUN Map so that each initiator can only access the LUNs specified for it.

You must enable LUN Masking in order apply a LUN map. See page 98.

To specify an iSCSI or a Fibre Channel 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 Unassigned Initiator List, click on an initiator to select it.
Or type the initiator name into the Initiator Name field.
8. Type a LUN into the Map to LUN field.
9. Click the **Assign** button.
The initiator appears in the Assigned Initiator List.
10. Click the **Submit** button.



Notes

- Obtain the initiator name from the initiator utility on your host system.
- The initiator name you input must match exactly in order for the connection to work.
- For iSCSI models, if iSNS is enabled, you can copy and paste the Initiator Name. Click on the iSCSI Management icon, then click on the iSNS tab dropdown menu and select Get Initiators. When the initiators display, highlight and copy the one you want and paste it into the Initiator Name field.

LUN Mapping Parameters

- Initiator Name – For iSCSI, the initiator name is the iSCSI name of the initiator device and is composed of a single text string. iSCSI WWNs are somewhat different from regular WWNs.
For Fibre Channel, the initiator name is the World Wide Port Name of the device and is composed of a series of eight, two-digit hexadecimal numbers.
- Alias – Optional. A common name for an iSCSI initiator
- Symbolic Name – Optional. A common name for a Fibre Channel initiator
- IP Address – IP address of the iSCSI port for this initiator
- Port ID – Port ID of the Fibre Channel port for this initiator
- LUN – Logical Unit Number on this logical drive for the selected initiator.
You must enter different LUN numbers for each logical drive.

Logical Drive LUN Settings: SCSI

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 95.

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 286.

You must assign an unconfigured physical drive in order for it to function as a spare drive. See “Create Spare Drive” on page 151.

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 258 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 286.

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.

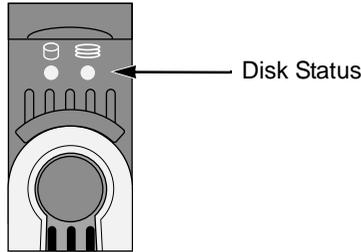


Figure 13. VTrak M500f/i/p disk carrier LEDs

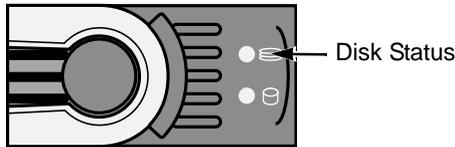


Figure 14. VTrak M300f/i/p and M200f/i/p disk carrier LEDs

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 143.

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 159)
- Audible Alarm (page 160)
- CLU Connection (page 161)
- CLU Function Map (page 164)
- Subsystem Management (page 173)
- Physical Drive Management (page 179)
- Disk Array Management (page 182)
- Logical Drive Management (page 188)
- Network Management (page 191)
- Fibre Channel Management (page 192)
- iSCSI Management (page 195)
- SCSI Management (page 198)
- Background Activity (page 199)
- Event Viewer (page 201)
- Additional Info and Management (page 202)
- Buzzer (page 214)

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.

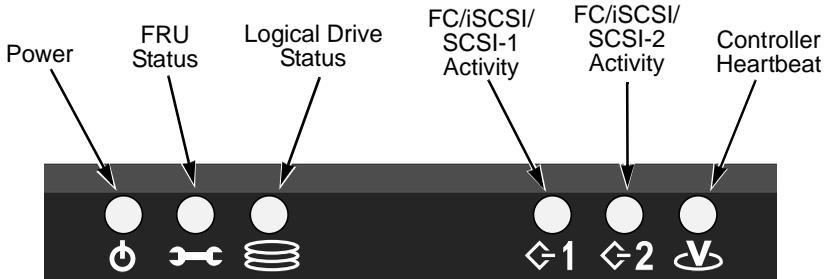


Figure 1. VTrak M500f/i/p front panel LED display

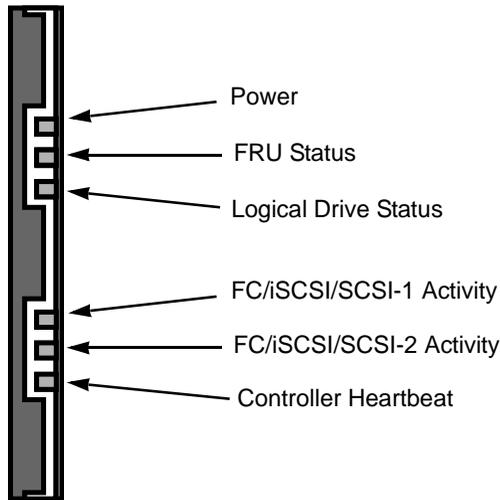


Figure 2. VTrak M300f/i/p and M200f/i/p front panel LED display

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

- Controller LED blinks green once per second for five seconds, goes dark for ten seconds, then blinks green once per second for five seconds again.
- Power, FRU and Logical Drive LEDs display green continuously.
- Fibre Channel/iSCSI/SCSI LEDs flash 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	n/a	n/a	n/a
FRU*	System Off	Normal	n/a	Fan or Battery Problem	Fan or Battery Failed
Logical Drive	System Off	Normal	n/a	Logical Drive Critical	Logical Drive Offline
FC/iSCSI/SCSI 1 or 2	No Activity	n/a	Activity	n/a	n/a
Controller	System Off	n/a	Normal**	n/a	n/a

“n/a” means this state does not apply to this LED.

* Field Replacement Unit. “n/a” means this state does not apply to this LED.

** Blinks five times in five seconds, five seconds dark, blinks five times again.

See page 215 for more information about field-replaceable components.

See page 286 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.

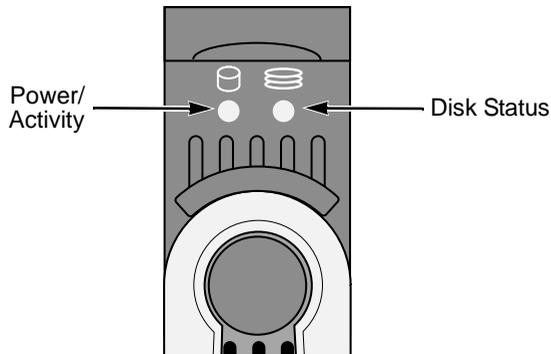


Figure 3. VTrak M500f/i/p disk carrier LEDs

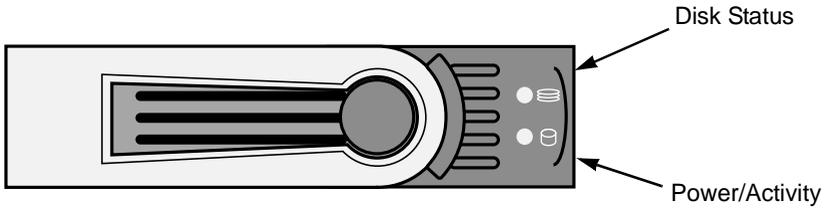


Figure 4. VTrak M300f/i/p and M200f/i/p disk carrier LEDs

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.

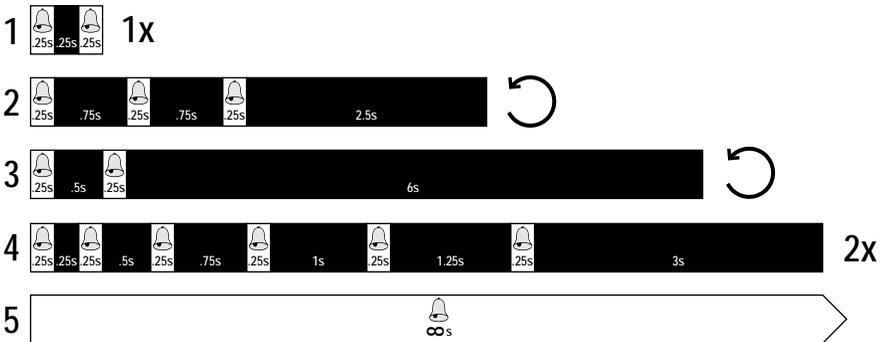
LEDs	State				
	Dark	Steady Green	Flashing Green	Amber	Red
Power/Activity	No Drive	Drive Present	Activity	n/a	n/a
Status	No Power/No Drive	Drive OK	n/a	Drive Rebuilding	Drive Error

“n/a” means this state does not apply to this LED.

See “Critical & Offline Disk Arrays” on page 286 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, do the following:

- 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.

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

See “Chapter 8: Troubleshooting” on page 261 for diagnostic help. To make alarm settings, see “Buzzer” on page 214.

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 25.

To start the telnet program:

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

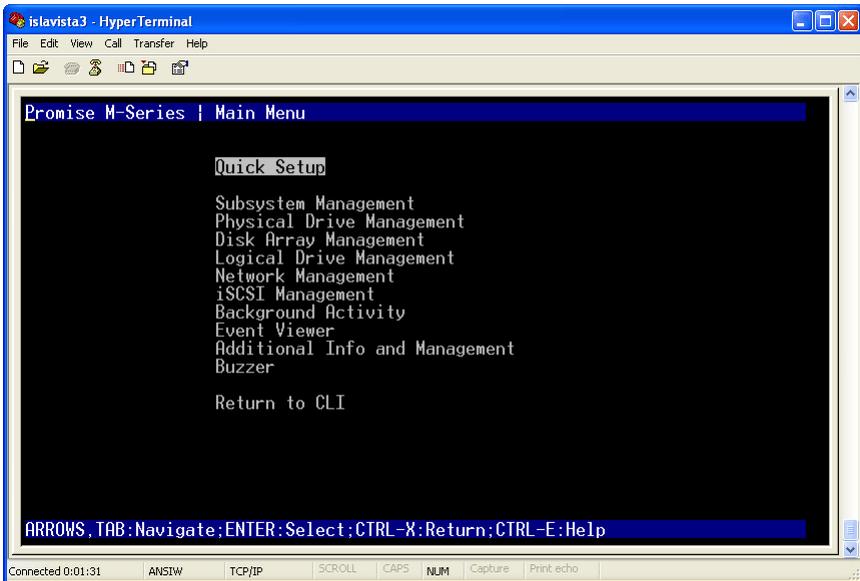
telnet 192.168.1.56 2300

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 (Fibre Channel and SCSI) – A sequence of four steps to setup System Date & Time, Management Port and RAID Configuration

Quick Setup (iSCSI) – A sequence of four steps to setup System Date & Time, Management Port, iSCSI Ports 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 (Fibre Channel and SCSI) – Set IP addresses for Management Port, gateway and DNS server; subnet mask.

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

Fibre Channel Management – Node information, Port information, settings, SFPs and statistics, list of initiators.

iSCSI Management – Node settings, Port statistics, Session information, iSNS options, SLP options, CHAPs and Ping function.

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

ALPA, Fibre Channel – Main Menu, Fibre Channel Management, Fibre Channel Ports, Fibre Channel port, Fibre Channel Port Settings

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

CHAP, create/delete – Main Menu, iSCSI Management, iSCSI CHAPS

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

C, continued

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

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, iSCSI port – Main Menu, Network Management, iSCSI port, NetMgmt iSCSI Port Settings

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

E, continued

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

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

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

Fibre Channel Port, settings – Main Menu, Fibre Channel Management, Fibre Channel Ports, Fibre Channel port, Fibre Channel Port Settings

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, iSCSI port – Main Menu, Network Management, iSCSI port, NetMgmt iSCSI Port Settings

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

H

Hard ALPA, Fibre Channel – Main Menu, Fibre Channel Management, Fibre Channel Ports, Fibre Channel port, Fibre Channel 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

I, continued

Initiator, create/delete – Main Menu, Additional Info and Management, LUN Mapping

Initiators, Fibre Channel – Main Menu, Fibre Channel Management, Fibre Channel Initiators

IP Address, DNS Server – Main Menu, Network Management, iSCSI port, NetMgmt iSCSI Port Settings

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

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

iSCSI, CHAP – Main Menu, iSCSI Management, iSCSI CHAPS

iSCSI iSNS Options – Main Menu, iSCSI Management, iSCSI iSNS Options, iSNS port

iSCSI Node, settings – Main Menu, iSCSI Management, iSCSI Node

iSCSI, ping – Main Menu, iSCSI Management, Ping

iSCSI Port, settings – Main Menu, Network Management, iSCSI port, NetMgmt iSCSI Port Settings

iSCSI Sessions – Main Menu, iSCSI Management, iSCSI Sessions

iSNS, options – Main Menu, iSCSI Management, iSCSI iSNS Options, iSNS port

L

Link Speed, Fibre Channel – Main Menu, Fibre Channel Management, Fibre Channel Ports, Fibre Channel port, Fibre Channel Port Settings

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

Logged In Devices, Fibre Channel – Main Menu, Fibre Channel Management, Fibre Channel Ports, Fibre Channel port, Logged In Devices

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 Masking, enable/disable – 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

Node, Fibre Channel – Main Menu, Fibre Channel Management, Fibre Channel Node

Node, iSCSI – Main Menu, iSCSI Management, iSCSI Node

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

P, continued

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

Physical Drives – Main Menu, Physical Drive Management

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

Ping, iSCSI – Main Menu, iSCSI Management, Ping

Port, Fibre Channel – Main Menu, Fibre Channel Management, Fibre Channel Ports

Port, iSCSI – Main Menu, iSCSI Management, iSCSI Ports

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

Sessions, iSCSI – Main Menu, iSCSI Management, iSCSI Sessions

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

SFP, Fibre Channel Port – Main Menu, Fibre Channel Management, Fibre Channel Ports, Fibre Channel port, Fibre Channel Port SFP

Shutdown – Main Menu, Additional Info and Management, Shutdown

SLP, iSCSI – Main Menu, iSCSI Management, iSCSI SLP Options, SLP port

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

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

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, Fibre Channel Port – Main Menu, Fibre Channel Management, Fibre Channel Ports, Fibre Channel port, Fibre Channel Port Statistics

Statistics, iSCSI port – Main Menu, iSCSI Management, iSCSI Ports, iSCSI port

S, continued

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

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

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

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

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

Topology, Fibre Channel – Main Menu, Fibre Channel Management, Fibre Channel Ports, Fibre Channel port, Fibre Channel Port Settings

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

U, continued

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

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 29.

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 215.

Blowers

This screen displays the status and speed of VTrak's blowers. There are two blowers in each cooling unit. 500-series VTraks have two cooling units. 300- and 200-series VTraks have one 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 215.

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 261.

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 261.

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. The default values are as follows:

- Enclosure Warning, 45°C
 - Enclosure Critical, 51°C
 - Controller Warning, 63°C
 - Controller Critical, 68°C
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 recharge 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 is 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 239.

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 choose do one of the following:
 - 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 254.

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 258.

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 239.

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, 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 182.

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 and, on iSCSI models, the iSCSI ports. The other parameters specific to iSCSI, see "iSCSI Management" on page 195.

Management Port Settings

1. From the Main Menu, highlight *Network Management* and press Enter.
2. Highlight the management or iSCSI port you want 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.

iSCSI Port Settings

This feature applies to VTrak iSCSI models only.

1. From the Main Menu, highlight *Network Management* and press Enter.
2. Highlight the iSCSI port you want and press Enter.
3. Highlight *NetMgmt iSCSI 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.

Fibre Channel Management

Fibre Channel Management deals with all Fibre Channel settings. This feature appears only with VTrak Fibre Channel models.

Node

These functions affect both VTrak Fibre Channel ports.

1. From the Main Menu, highlight *Fibre Channel Management* and press Enter.
2. Highlight *Fibre Channel Node* and press Enter.

Node information appears. There are no user settings on this screen.

Ports

These functions affect both VTrak Fibre Channel ports.

1. From the Main Menu, highlight *Fibre Channel Management* and press Enter.
2. Highlight *Fibre Channel Ports* and press Enter.
3. Highlight *Fibre Channel Port 1* or *Port 2* and press Enter.

Port information appears.

Logged-in Devices

To see a list of devices logged-in to this port, highlight *Logged In Devices* and press Enter. If a Fibre Channel switch is attached, it will also appear in this list.

Port Settings

1. Highlight *Fibre Channel Port Settings* and press Enter.
2. Highlight the following parameters and press the spacebar to toggle through the choices:
 - Configured Link Speed – 1GB, 2GB or Automatic selection
 - Configured Topology – NL-Port (Arbitrated Loop), N-Port (Point to Point) or Automatic selection
3. Highlight *Hard ALPA* and press the backspace key to erase the current value, then type the new value.
The range is 0 to 255. 255 disables this feature.
4. Press Ctrl-A to save your settings.

The table below shows the type of attached topology you will achieve based on your connection type and the configured topology you select:

Fibre Channel Attached Topology		
	Configured Topology	
Connection Type	N-Port	NL-Port
Switch	Fabric Direct	Public Loop
Direct	Point to Point	Private Loop

Example 1: If you connect the VTrak to a Fibre Channel switch and select NL-Port topology, you will create a Public Loop attached topology.

Example 2: If you have a Point to Point attached topology, you made a direct connection (no switch) and selected N-port topology.



Note

In some cases, HBA settings to N-Port only work if connected to the switch. Refer to your HBA manual for more information.

Port SFP

This screen displays the following information about the SFPs (small form-factor pluggable transceivers). There are no user settings on this screen.

- Connector type
- Bitrate
- Link Length – Maximum length depending on the type of fiber or copper

- Transceiver type
- Transceiver code
- Manufacturing Date – Year, month, day format
- Vendor Name – Vendor name of the SFP transceiver
- Vendor OUI – Organizational Unique Identifier, part of the MAC address
- Vendor Part Number
- Vendor Revision
- Vendor Serial Number

Port Statistics

This screen displays statistics for this port. There are no user settings on this screen.

- Number of frames sent
- Number of frames received
- Number of words sent
- Number of words received
- Loss Sync Count
- Loss Signal Count
- LIP Count – Loop initialization primitive count
- Initiator IO Count
- Time since last reset
- Number of error frames
- Number of dumped frames
- Invalid Word Sent Count
- Invalid CRC Count
- Link Failure Count
- Primitive Sequence Error Count
- NOS Count – Not operational primitive sequence count

Fibre Channel Initiators

1. From the Main Menu, highlight *Fibre Channel Management* and press Enter.
2. Highlight *Fibre Channel Initiators* and press Enter.

A list of initiators appears.

To create or delete an initiator, highlight *Additional Info and Management* and press Enter. Then highlight *LUN Mapping* and press Enter.

iSCSI Management

iSCSI Management deals with all iSCSI settings and functions with the exception of network connections and settings. This feature appears only with VTrak iSCSI models. Network connections and settings are discussed under “Network Management” on page 191.

Node

These functions affect both VTrak iSCSI ports. There are more iSCSI settings under iSNS Ports, SLP Ports and CHAP.

Note that Header and Data Digest work best with initiators that have a TCP Offload Engine (TOE).

1. From the Main Menu, highlight *iSCSI Management* and press Enter.
2. Highlight *iSCSI Node* and press Enter.
Node information appears.
3. Highlight *iSCSI Node Settings* and press Enter.
This screen enables you to make iSCSI Node Settings.
4. Highlight the items you want and press the backspace key to erase the current value, then type the new value:
 - Node Name
 - Node Alias – Maximum of 32 characters. Use letters, numbers, space between words and underscore. An alias is optional.
 - Outstanding R2T
 - Maximum Burst Length
 - Default Time to Wait
 - Default Time to Retain
5. Highlight the items you want to set and press the spacebar to toggle between *Enabled* and *Disabled*:
 - Header Digest
 - Data Digest
 - Unidirectional CHAP Authorization
 - Bidirectional CHAP Authorization
6. Press Ctrl-A to save your settings.

Ports

1. From the Main Menu, highlight *iSCSI Management* and press Enter.
2. Highlight *iSCSI Ports* and press Enter.
3. Highlight *iSCSI Port 1* or *Port 2* and press Enter.

Port information appears.

Port Statistics

To access port statistics, highlight one of the following and press Enter:

- MAC Layer Statistics
- IP Layer Statistics
- TCP Layer Statistics
- iSCSI Layer Statistics

Sessions

1. From the Main Menu, highlight *iSCSI Management* and press Enter.
2. Highlight *iSCSI Sessions* and press Enter.
A list of the current iSCSI sessions appears.

iSNS

1. From the Main Menu, highlight *iSCSI Management* and press Enter.
2. Highlight *iSCSI iSNS Options* and press Enter.
3. Highlight *iSNS Port 1* or *Port 2* and press Enter.
iSNS Port information appears.
4. Highlight *iSNS Port Settings* and press Enter.
5. Highlight *iSNS* and press the spacebar to toggle between *Enabled* and *Disabled*.

When enabled, you must enter the following iSNS IP address and port number.

6. Highlight the items you want and press the backspace key to erase the current value, then type the new value:
 - iSNS IP address
 - iSNS Port number
7. Press Ctrl-A to save your settings.

SLP

1. From the Main Menu, highlight *iSCSI Management* and press Enter.
2. Highlight *iSCSI SLP Options* and press Enter.
3. Highlight *SLP Port 1* or *Port 2* and press Enter.
SLP Port information appears.
4. Highlight *SLP* and press the spacebar to toggle between *Enabled* and *Disabled*.

When enabled, you must indicate whether to use a Directory Agent.

5. Highlight *Use Directory Agent (DA)* and press the spacebar to toggle between *Yes* and *No*.
6. Highlight *Auto DA IP* and press the spacebar to toggle between *Yes* and *No*.
7. If you specified *No*, highlight *Directory Agent IP* and press the backspace key to erase the current value, then type the new value.
8. Press Ctrl-A to save your settings.

CHAP

1. From the Main Menu, highlight *iSCSI Management* and press Enter.
2. Highlight *iSCSI CHAPs* and press Enter.

A list of the current CHAPs appears.

Add a CHAP

1. Highlight *Create New CHAP Entry* and press Enter.
2. Highlight name and type a name for the CHAP.
3. Highlight *CHAP Type* and press the spacebar to toggle between *Peer* and *Local*.

Peer is one-way. Local is bi-directional.

4. Highlight *Secret* and type a name of 16 or more characters.
5. Highlight *Retype Secret* and type the secret again to verify.
6. Press Ctrl-A to save the CHAP.

Delete a CHAP

1. Highlight the CHAP you want to delete and press Enter to mark it.
The mark is an asterisk (*) to the left of the listing.
2. Highlight *Delete Marked Entries* and press Enter.
3. Press Y to confirm the deletion.

Ping

This function enables you to ping other network nodes (PCs, servers, etc.) through VTrak's iSCSI ports.

1. From the Main Menu, highlight *iSCSI Management* and press Enter.
2. Highlight *Ping* and press Enter.
3. Type the IP address you want to ping in the IP Address field.
4. Highlight *Ping Through* and press the spacebar to select an iSCSI port.
5. Highlight *Ping* and press Enter.

The results of the ping are displayed on the screen.

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 258 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 (Fibre Channel and iSCSI)

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *LUN Mapping* and press Enter.
A list of the current iSCSI or Fibre Channel initiators appears.

LUN Mapping must be enabled in order for VTrak to recognize the initiator. If LUN Mapping is currently disabled, highlight *Enable LUN Mapping* and press Enter.

Create New Initiator

1. Highlight *Create New Initiator* and press Enter.
2. Type the name of the initiator.

Obtain the initiator name from the initiator utility on your host system. The initiator name must match exactly the initiator's name setting from the host side in order for the connection to work.

A Fibre Channel initiator name is the World Wide Port Name of the device and is composed of a series of eight, two-digit hexadecimal numbers, separated by a dash (-).

An iSCSI initiator name is the iSCSI name of the initiator device and is composed of a single text string.

3. Press Ctrl-A to save the initiator.



Note

LUN Mapping must be enabled in order for VTrak to recognize the initiator.

Delete Initiator

1. Highlight the initiator 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 Initiators* and press Enter.
3. Press Y to confirm the deletion.

Map a LUN to an Initiator

1. Highlight an existing Initiator and press Enter. A list of logical drives displays.
2. In the LUN field, press the backspace key to erase the current value, then type the LUN you want to assign to this initiator, from 0 to 255. If you make a error, press Ctrl-R to restore the current LUN.
3. Press Ctrl-A to save the LUN map.

LUN Mapping (SCSI)

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 198.

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: The default name is cim. You cannot change the name or add users.

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 219 for this procedure.

Clear Statistics

This function clears the statistical counts for the RAID controller, Fibre Channel ports, iSCSI ports, 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 217)
- Firmware Update – CLU (page 219)
- Replace Power Supply – All Models (page 220)
- Replace Cooling Unit Fan – M500f/i/p (page 221)
- Replace Cooling Unit Fan – M300f/i/p and M200f/i/p (page 226)
- Replace Cache Battery – M500f/i/p (page 230)
- Replace Cache Battery – M300f/i/p and M200f/i/p (page 233)
- Replace SEP – M500f/i/p (page 235)
- Replace SEP – M300f/i/p and M200f/i/p (page 236)
- Replace RAID Controller – All Models (page 237)

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 Storage Enclosure Processor (SEP) and RAID Controller are field-replaceable but they require you to power down the VTrak.

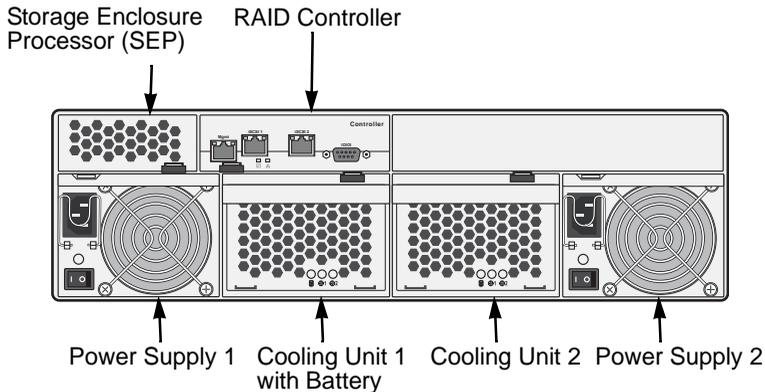


Figure 1. Field Replaceable Units (FRUs) on VTrak M500i (M500f/p are similar)

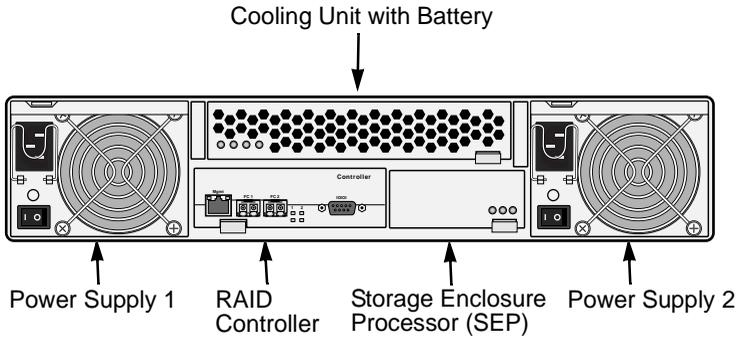


Figure 2. Field Replaceable Units (FRUs) on VTrak M300f/M200f (M300i/p and M200i/p are similar)

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 261 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:
 - 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:
 - 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 – All Models



Figure 6. The VTrak M500f/i/p power supply shown above. The M300f/i/p and M200f/i/p are similar

The power supply and its fan are replaced as one unit. There are no individually serviceable parts. No tools are required for this procedure.

To remove the power supply, do the following:

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, do the following:

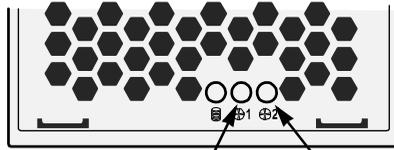
1. Carefully slide the power supply into the enclosure.
2. Gently press the handle in and upward until it locks (above, right).
3. Plug in the power cord.
4. Switch on the power supply.
5. Verify that the new power supply LED is green.

This completes the power supply replacement procedure.

Replace Cooling Unit Fan – M500f/i/p

The blowers (scroll fans) in the cooling units are replaced as individual parts.

There are two fans in each cooling unit. No tools are required for this procedure.



Fan 1 LED Fan 2 LED

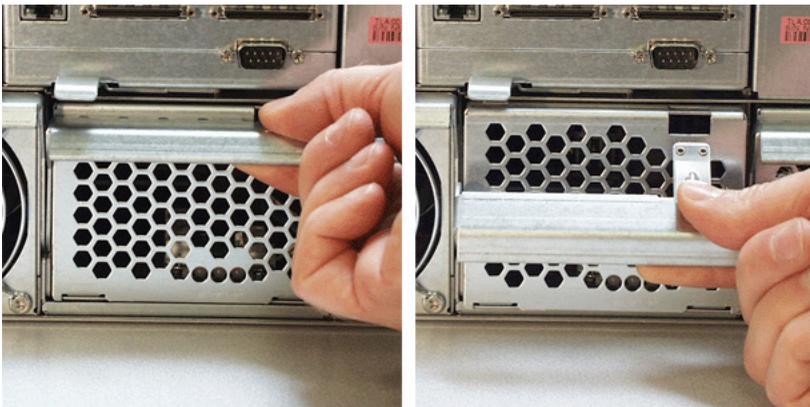


Cautions

- If the cooling unit you plan to remove contains the cache backup battery, 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 144 (WebPAM PROe) or “Logical Drive Settings and Functions” on page 189. (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 295.

To replace a fan, do the following:

1. Verify that the Fan LED is amber or red and note whether it is Fan 1 or 2 (above).

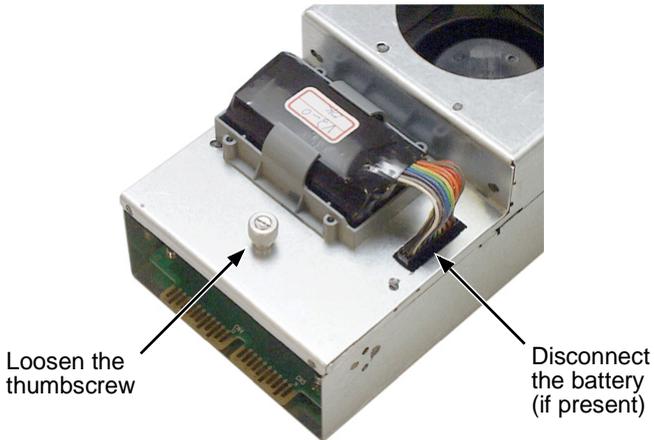


2. Press the release button and pull the handle downward as shown above.

3. Pull the cooling unit out of the VTrak enclosure. An example of a VTrak cooling unit appears below.

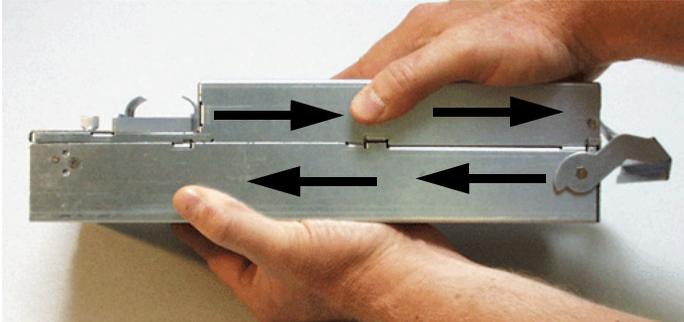


To open the cooling unit, do the following:

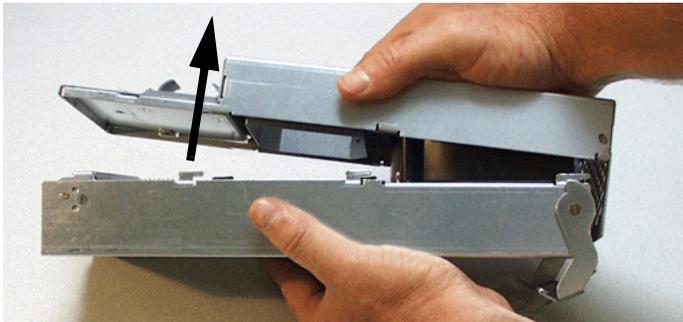


4. If there is a battery on the cooling unit, disconnect the battery connector (above).

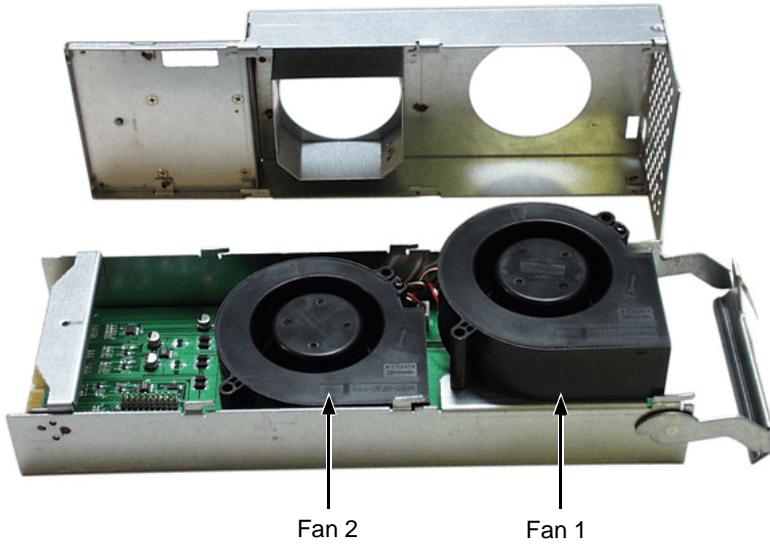
5. Loosen the thumbscrew (above). A retainer keeps the thumbscrew in place.



6. Grasp the top and bottom sections of the cooling unit with your hands as shown above.
7. Hold the lower section and pull the upper section to the right.

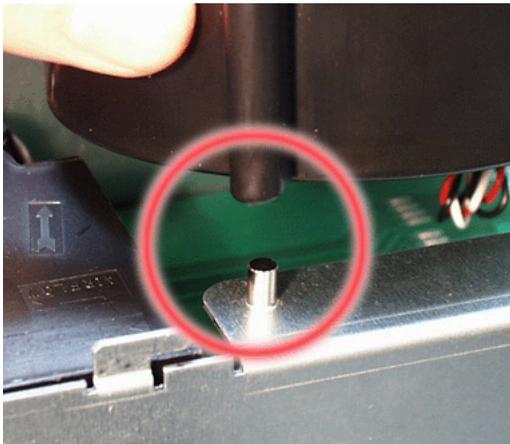


8. Separate the cooling unit section to access the blowers.

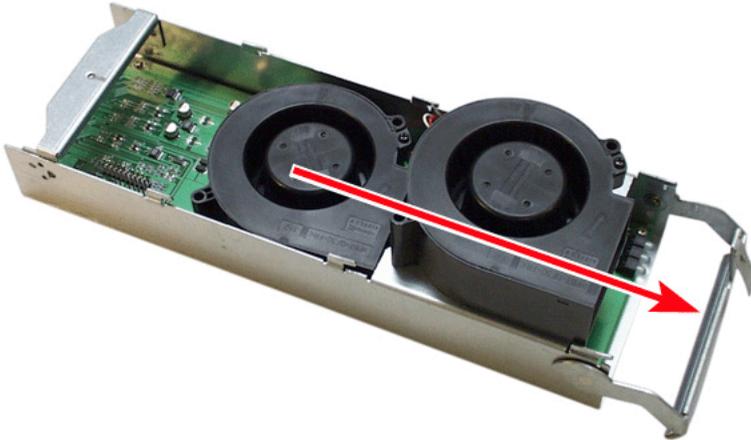


The upper fan is Fan 1, the lower fan is Fan 2. From the LEDs on the cooling unit (see the diagram on page 221), you know which fan to replace.

9. Lift the fan off the mounting pins and detach the electrical connector.
10. Attach the electrical connector of the new fan and set it in place.

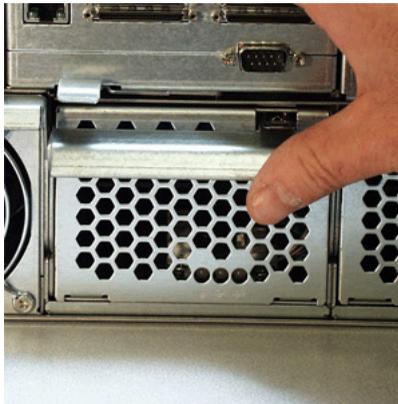


Be sure you set the fan on the mounting pins, as shown above.



Be sure the fans point outward, towards the handle (above).

11. Place the top section of the cooling unit onto the bottom section and slide the top lock it in place.
12. Tighten the thumbscrew.
13. If there is a battery on the cooling unit, reattach the battery connector.
14. Carefully slide the cooling unit into the enclosure.



15. Gently press the handle in and upward until it locks.
16. Verify that the Fan LEDs are green.

This completes the fan replacement procedure.

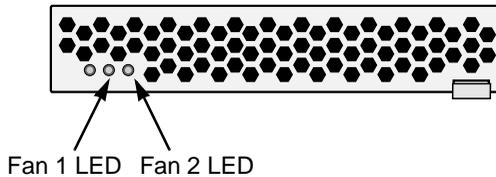
Replace Cooling Unit Fan – M300f/i/p and M200f/i/p



Cautions

- The Cooling Unit is NOT a hot-swappable device. Power-down the VTrak before removing it.
- 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 295.

The blowers (scroll fans) in the cooling units are replaced as individual parts. There are two fans in each cooling unit. No tools are required for this procedure.



To replace a fan, do the following:

1. Verify that the Fan LED is amber or red and note whether it is Fan 1 or 2. See the diagram above.
2. Power down the VTrak.



3. Grasp the cooling unit handle and pull it toward you, as shown above.
4. Pull the cooling unit out of the VTrak enclosure.

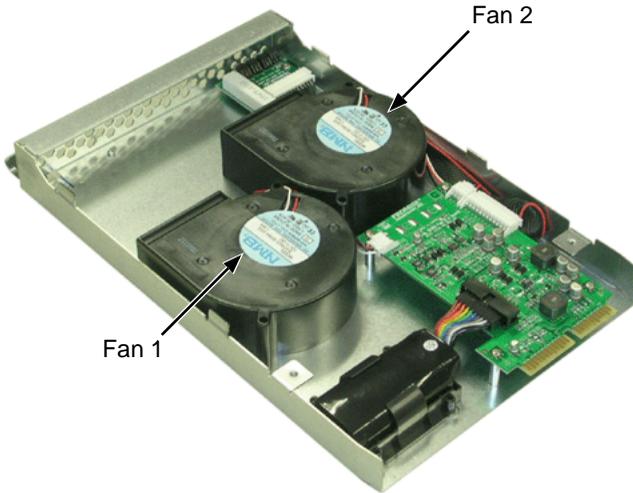


An example of a VTrak cooling unit appears above.



5. Loosen the thumbscrews (above). Retainers keep the thumbscrews in place.
6. Grasp the top of the cooling unit near the thumbscrews and lift it away from the bottom.

7. Separate the cooling unit sections to access the blowers.

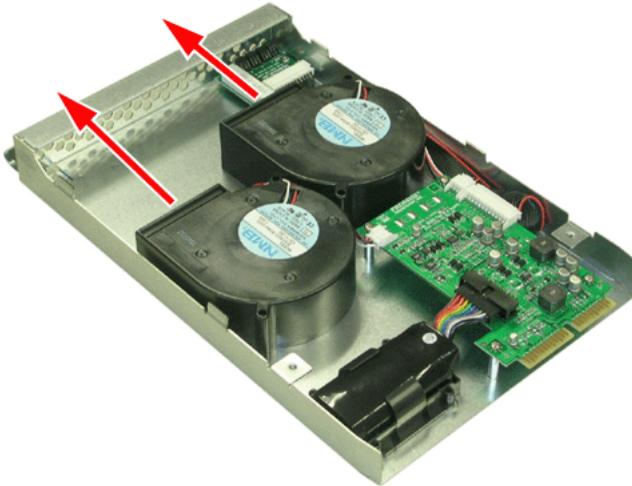


Viewed from the inside (battery) end on the cooling unit, the left blower is Fan 1, the right blower is Fan 2. From the LEDs (see the diagram on page 221), you know which fan to replace.

8. Lift the blower off the mounting pins and detach the electrical connector.
9. 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 blowers point outward, towards the handle, as shown above.

10. Place the top section of the cooling unit onto the bottom section.
11. Tighten the thumbscrews.
12. Carefully slide the cooling unit into the enclosure.
13. Press on the screen to seat the cooling unit (above). The handle will swing in as the cooling unit is properly seated.
14. Boot the VTrak and verify that the Fan LEDs are green.

This completes the fan replacement procedure.

Replace Cache Battery – M500f/i/p

The cache battery is located in the Cooling Unit 1 (the left one). The battery is replaced as an individual part. No tools are required for this procedure.

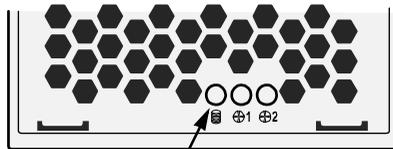


Cautions

- Try reconditioning the battery before you replace it. See “Battery” on page 120 for more information.
 - 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 144 (WebPAM PROe) or “Logical Drive Settings and Functions” on page 189. (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 295.
-

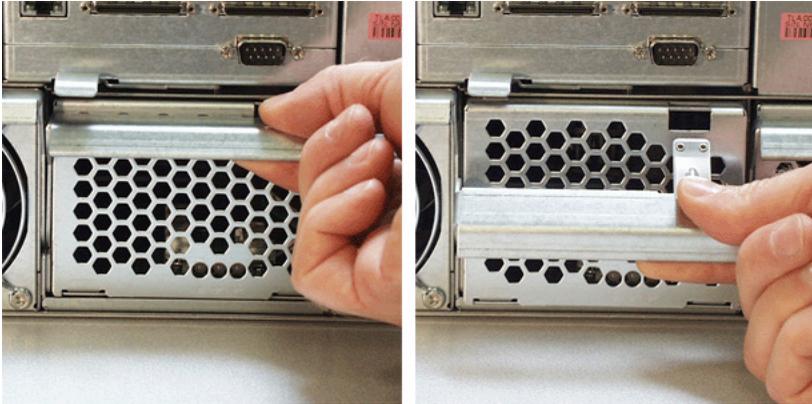
Note that the Battery LED on Cooling Unit 2 is always dark.

To replace a cache battery, do the following:

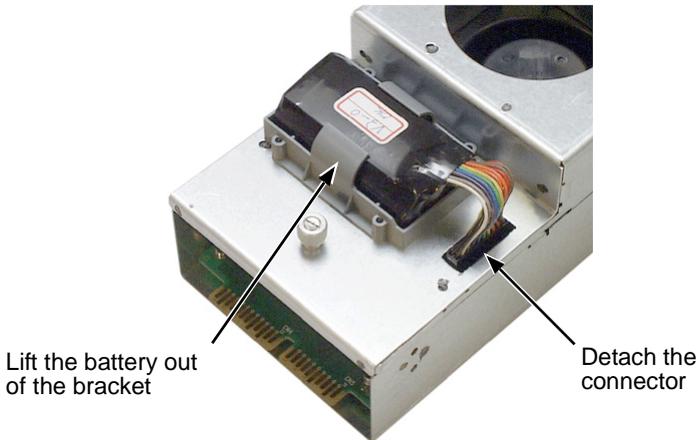


Battery LED

1. Verify that the battery LED is amber or red (above).

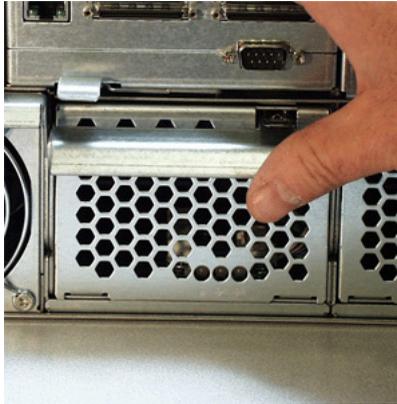


2. Press the release button and pull the handle downward as shown above.
3. Pull the cooling unit out of the VTrak enclosure.



4. Detach the connector and lift the battery out of the bracket (above).
5. Place a new battery into the bracket and attach the connector.

6. Carefully slide the cooling unit into the enclosure.



7. Gently press the handle in and upward until it locks (above).
8. Verify that the battery LED is green.

This completes the battery replacement procedure.

Replace Cache Battery – M300f/i/p and M200f/i/p

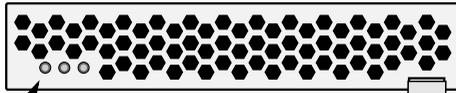
The cache battery is located in the Cooling Unit. The battery is replaced as an individual part. No tools are required for this procedure.



Cautions

- Try reconditioning the battery before you replace it. See “Battery” on page 120 for more information.
- The Cooling Unit is NOT a hot-swappable device. Power-down the VTrak before removing it.
- Installing an incorrect replacement battery may result in an explosion.
- Dispose of used batteries according to the instructions that accompany the battery.
- 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 295.

To replace a cache battery, do the following:

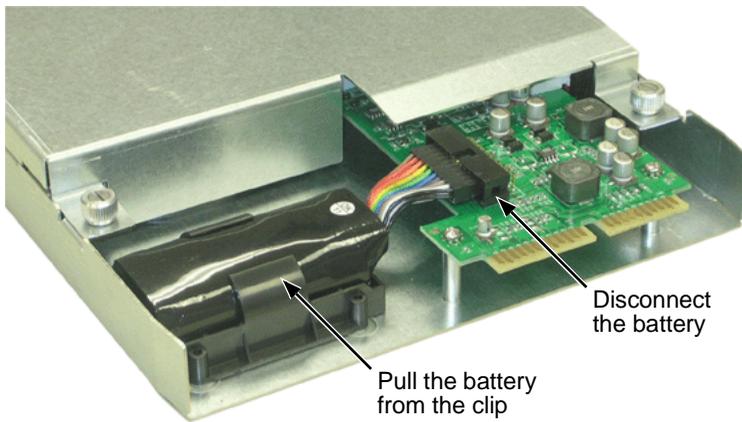


Battery LED

1. Verify that the battery LED is amber or red (above).
2. Power down the VTrak.



3. Grasp the cooling unit handle and pull it toward you, as shown above.
4. Pull the cooling unit out of the VTrak enclosure.



5. Detach the connector and lift the battery out of the bracket (above).
6. Place a new battery into the bracket and attach the connector.
7. Carefully slide the cooling unit into the enclosure.
8. Press on the screen to seat the cooling unit (above). The handle will swing in as the cooling unit is properly seated.
9. Boot the VTrak and verify that the Battery LED is green.

This completes the battery replacement procedure.

Replace SEP – M500f/i/p

The Storage Enclosure Processor (SEP) manages the fans, audible alarm, and battery, and monitors system voltages and cooling functions. No tools are required for this procedure.



Caution

The SEP is NOT a hot-swappable device. Power-down the VTrak before removing it.



Important

Do not replace the SEP based on LED colors alone. Only replace the SEP when directed to do so by Promise Technical Support. See page 299.



To remove and replace the SEP, do the following:

1. Power down the VTrak.
2. Grasp the handle and pull it toward you (above, left).
3. Holding the handle, pull the SEP out of the enclosure (above, center).
4. Gently slide the new SEP into the enclosure.
5. Press on the screen to seat the SEP (above, right). The handle will swing in as the SEP is properly seated.
6. Power up the VTrak.

This completes the Storage Enclosure Processor replacement procedure.

Replace SEP – M300f/i/p and M200f/i/p

The Storage Enclosure Processor (SEP) manages the fans, audible alarm and battery, and monitors system voltages and cooling functions. No tools are required for this procedure.



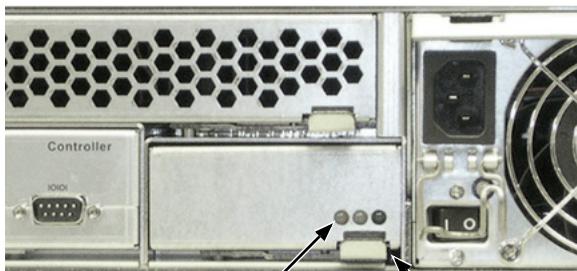
Caution

The SEP is NOT a hot-swappable device. Power-down the VTrak before removing it.



Important

Do not replace the SEP based on LED colors alone. Only replace the SEP when directed to do so by Promise Technical Support. See page 299.



Function LEDs

Release Handle

To remove and replace the SEP, do the following:

1. Power down the VTrak.
2. Grasp the handle and pull it toward you (above).
3. Holding the handle, pull the SEP out of the enclosure.
4. Gently slide the new SEP into the enclosure.
5. Press on the screen to seat the SEP. The handle will swing in as the SEP is properly seated.
6. Power up the VTrak.

This completes the Storage Enclosure Processor replacement procedure.

Replace RAID Controller – All Models

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 299.

To remove and replace the RAID Controller, do the following:

1. Power down the VTrak.
2. Remove the network, Fibre Channel, iSCSI, or SCSI and null modem cables.
3. Grasp the handle and pull it toward you.
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 in as the Controller is properly seated.
7. Attach the network, Fibre Channel, iSCSI, or 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 247)
 - Stripe Size (page 250)
 - Sector Size (page 250)
 - Cache Policy (page 251)
 - Capacity Coercion (page 252)
 - Initialization (page 253)
 - Hot Spare Drive(s) (page 253)
 - Partition and Format the Logical Drive (page 254)
 - RAID Level Migration (page 254)
 - Media Patrol (page 257)
 - Predictive Data Migration (PDM) (page 257)
 - Transition (page 258)
-

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 247. 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.

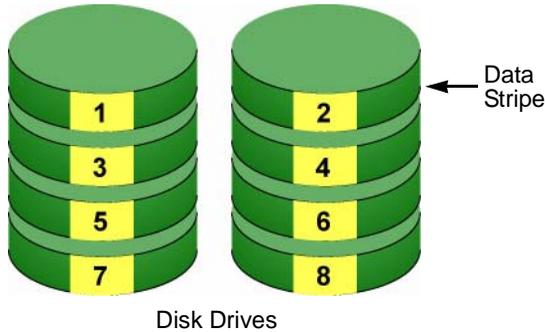


Figure 1. RAID 0 Striping interleaves data across multiple drives

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.

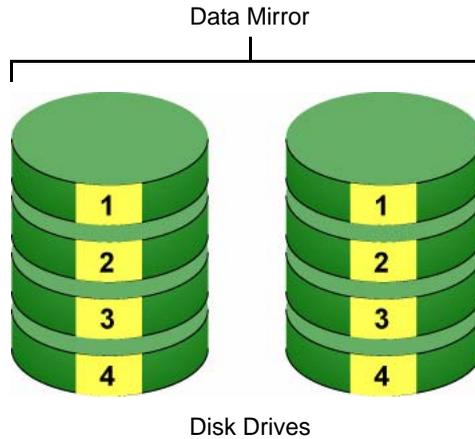


Figure 2. RAID 1 Mirrors identical data to two drives

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.

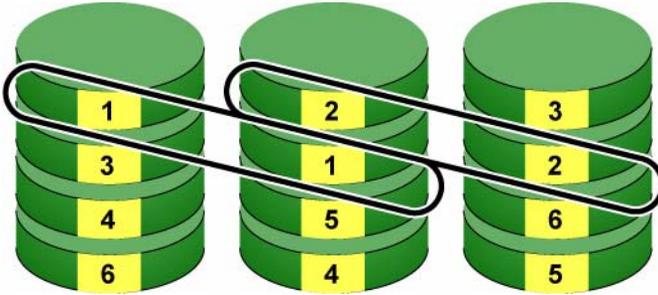
RAID 1 arrays use two physical drives. You can create multiple RAID 1 disk arrays on the same Promise product.

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

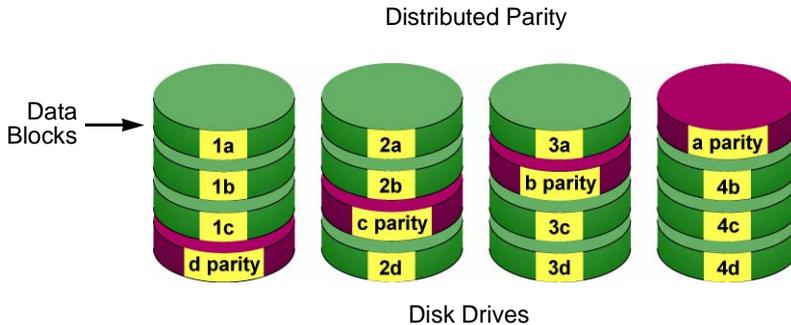


Figure 3. RAID 5 Stripes all drives with data and parity information

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 10 – Mirror + Stripe

Mirroring/striping 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.

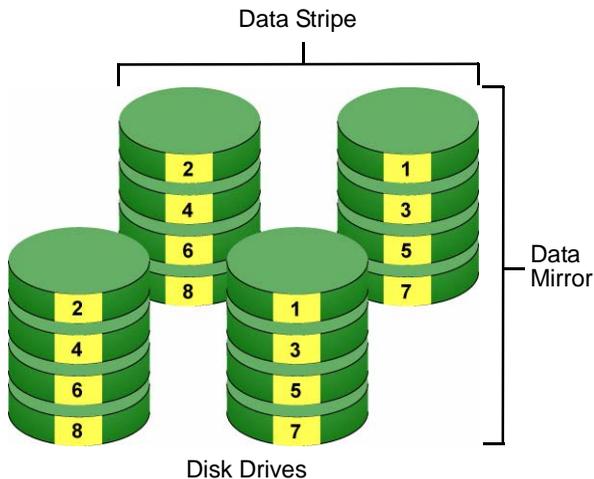


Figure 4. RAID 10 takes a data mirror on one drive pair and stripes it over two drive pairs

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.

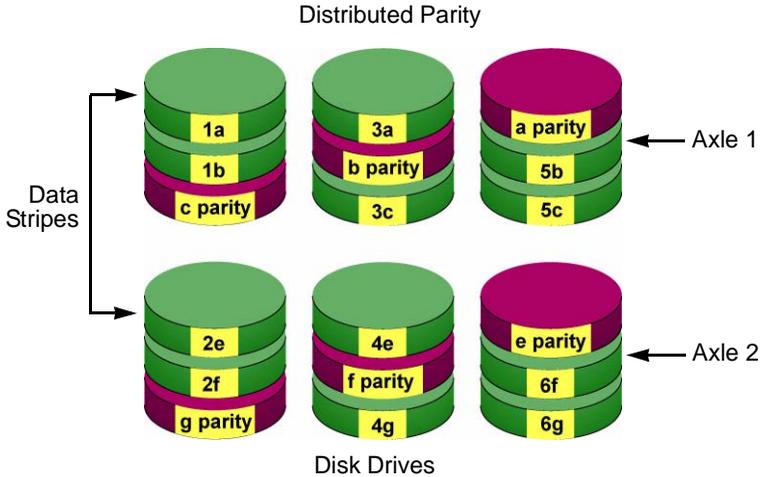


Figure 5. RAID 50 Striping of Distributed Parity disk arrays

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
13	2	6,7
	3	4,4,5
	4	3,3,3,4
14	2	7,7
	3	4,5,5
	4	3,3,4,4
15	2	7,8
	3	5,5,5
	4	3,4,4,4
	5	3,3,3,3,3

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 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 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 135
- On an existing logical drive. See “Logical Drive Settings” on page 144

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 145.



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 153 (WebPAM PROe) or “Spare Drive Management” on page 202 (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 258.

See also “Critical & Offline Disk Arrays” on page 286.

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 of the following:

- 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	•	•		•

From	To	Increase		Redundancy	
		Capacity	Performance	Add	Lose
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



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 iSCSI, SCSI, and Fibre Channel 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 blocks x 512 bytes per sector = 2,048,000,000,000 bytes of data for a 2TB drive.

Note that you cannot change the size of the sectors nor can you increase the number of address blocks above 4 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 137 (WebPAM PROe) or page 188 (CLU).
3. Create a new logical drive with the desired capacity.
See page 135 (WebPAM PROe) or page 187 (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 128.

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 126 for WebPAM PROe or see "Clear Stale and PFA Conditions" on page 180 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 147.

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:

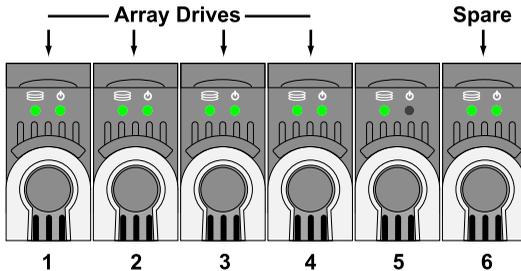
- You create a revertible spare drive.
See page 151 (WebPAM PROe) or page 202 (CLU).
- A physical drive assigned to your disk array fails and the array goes critical or degraded.
- VTrak automatically rebuilds your array to the revertible spare drive and the array becomes functional again.
- You replace 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.

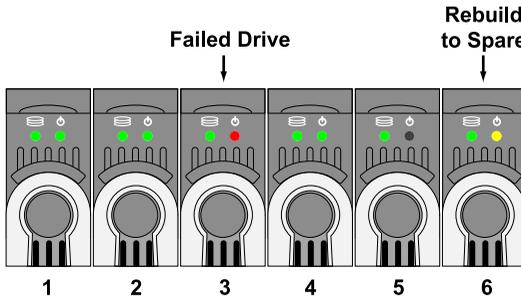
See the example below.

Example

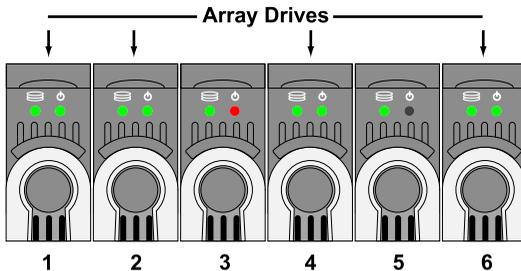
Following is an example to explain the Transition function.



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.

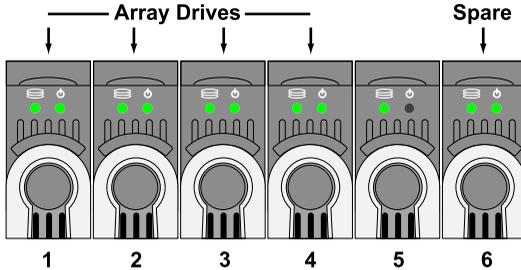


When the rebuild is complete, the spare drive has replaced the failed drive. In this example, failed drive 3 was replaced by spare drive 6. The disk array now consists of physical drives 1, 2, 4, and 6.

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.



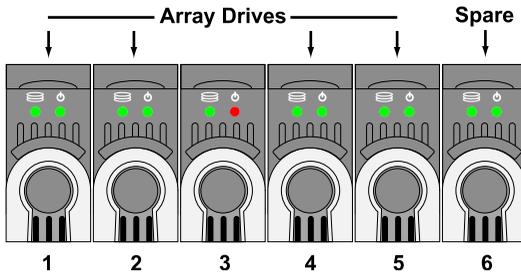
When the VTrak controller detects the new drive in slot 3, it will:

- 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 140 (WebPAM PROe) or page 187 (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.

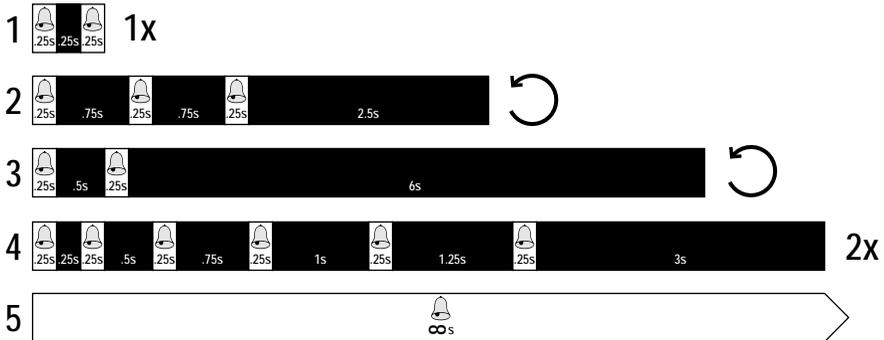
Chapter 8: Troubleshooting

- VTrak is Beeping (below)
- LEDs Display Amber or Red (page 262)
- CLU Reports a Problem (page 268)
- WebPAM PROe Reports a Problem (page 269)
- LEDs Display Amber or Red (page 262)
- Event Notification Response (page 271)
- Critical & Offline Disk Arrays (page 286)
- Enclosure Problems (page 289)
- Connection Problems (page 292)
- Unsaved Data in the Controller Cache (page 295)

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, do the following:

- 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 269).

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 121 (WebPAM PROe) or page 214 (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.

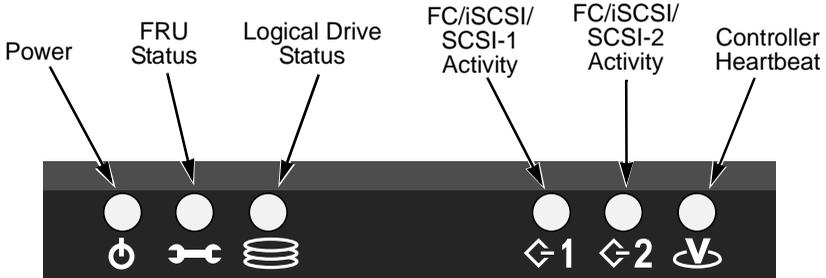


Figure 1. VTrak M500f/i/p Front Panel LEDs

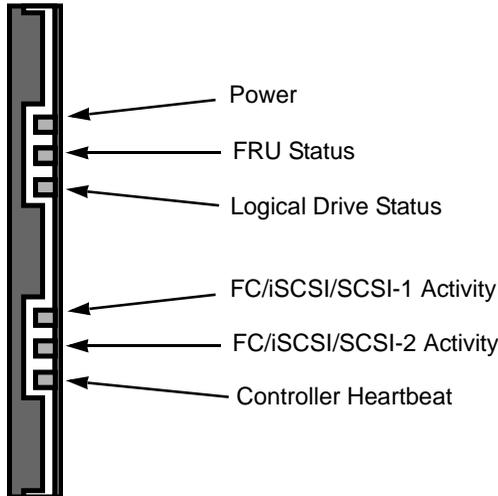


Figure 2. VTrak M300f/i/p and M200f/i/p front panel LEDs

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

- Controller LED blinks green once per second for five seconds, goes dark for ten seconds, then blinks green once per second for five seconds again.
- Power, FRU, and Logical Drive LEDs display green continuously.

- Fibre Channel/iSCSI/SCSI LEDs flash 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	n/a	n/a	n/a
FRU*	System Off	Normal	n/a	Fan or Battery Problem	Fan or Battery Failed
Logical Drive	System Off	Normal	n/a	Logical Drive Critical	Logical Drive Offline
FC/iSCSI/SCSI 1 or 2	No Connection	n/a	Activity	n/a	n/a
Controller	System Off	n/a	Normal**	n/a	n/a
<p>“n/a” means this state does not apply to this LED.</p> <p>* Field Replacement Unit. “n/a” means this state does not apply to this LED.</p> <p>** Blinks five times in five seconds, five seconds dark, blinks five times again.</p>					

See page 215 for more information about field-replaceable components.
See page 286 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.

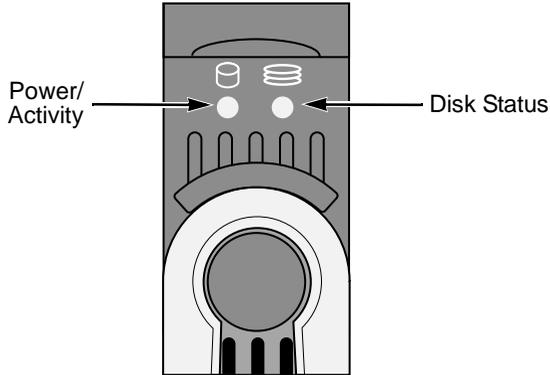


Figure 3. VTrak M500f/i/p Drive Carrier LEDs.

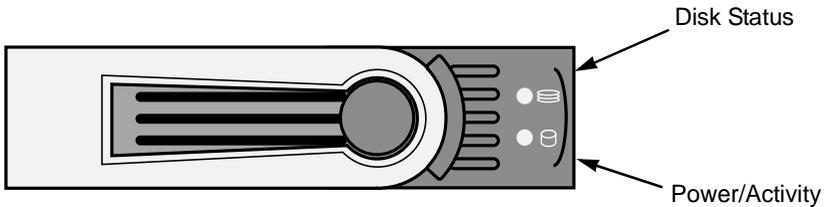


Figure 4. VTrak M300f/i/p and M200f/i/p disk carrier LEDs

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	n/a	n/a
Status	No Power/No Drive	Drive OK	n/a	Drive Rebuilding	Drive Error

“n/a” means this state does not apply to this LED.

See “Critical & Offline Disk Arrays” on page 286 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.

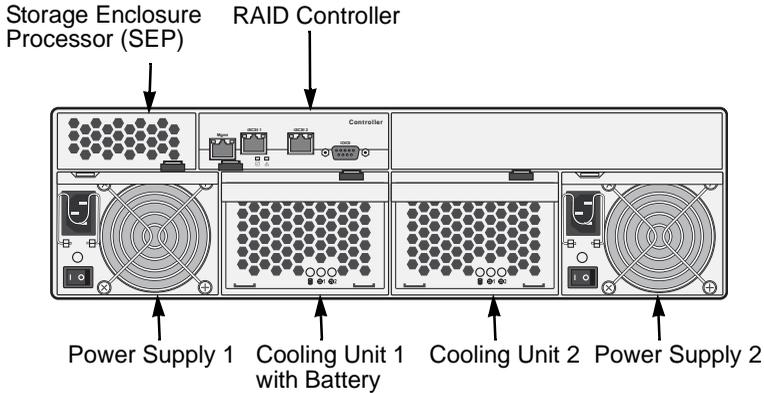


Figure 5. Field Replaceable Units (FRUs) on VTrak M500i (M500f/p are similar)

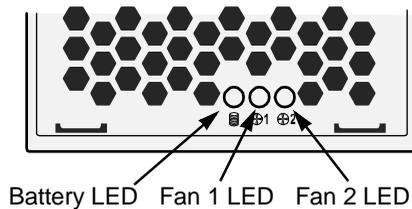


Figure 6. Battery and fan LEDs VTrak M500f/i/p

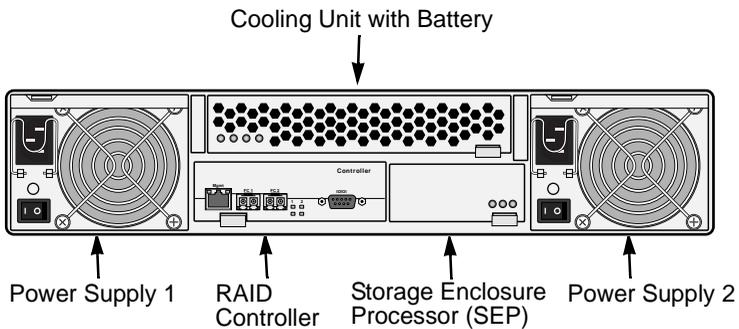


Figure 7. Field Replaceable Units (FRUs) on VTrak M300f/M200f (M300i/p and M200i/p are similar)

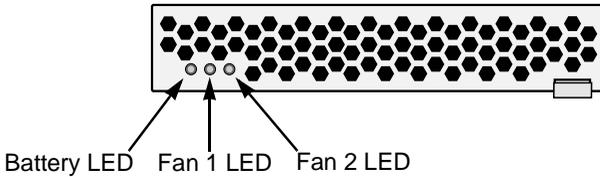


Figure 8. Battery and fan LEDs VTrak M300f/i/p and M200f/i/p

Under normal conditions, the power supply, battery, and fan LEDs should display green. Note that on the VTrak M-Class, the left cooling unit houses a cache-backup battery but the right unit does not.

LEDs	State			
	Dark	Green	Amber	Red
Power supply	Not detected	OK	Fan failed	Failed
Battery	Not detected	OK	Too hot or Low capacity	Failed
Fan 1 or 2	Not detected	OK	Wrong speed	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 215 for instructions.

The Controller Location LEDs, on the back of the VTrak subsystem, will flash for one minute.

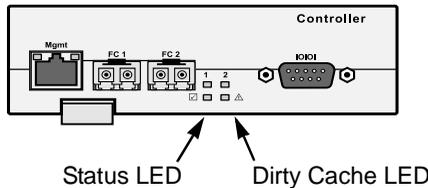


Figure 9. A VTrak Fibre Channel controller

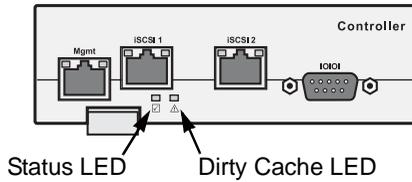


Figure 10.A VTrak iSCSI controller

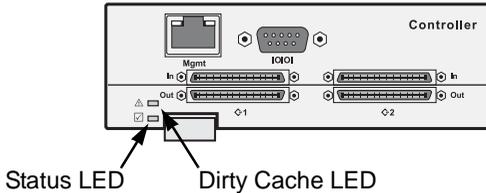


Figure 11.A VTrak SCSI controller

Under normal conditions, the Controller Status LED (marked with icon) is green and the Dirty Cache LED (marked with icon) is dark.

LEDs	State			
	Dark	Green	Amber	Flashing Amber
Status	no power	OK	Error	n/a
Dirty Cache	OK	n/a	Unsaved data in cache	OK

"n/a" means this state does not apply to this LED.

If the Controller Status LED is amber, restart the VTrak. See "Restart the Subsystem" on page 112 or "Shutdown and Restart" on page 213.

If the Controller Status LED continues to display amber after startup, contact Promise Technical Support. See "Contact Technical Support" on page 299.

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 remove the cooling unit (M300f/i/p, M200f/i/p) or the cooling unit with the battery (M500f/i/p) while this LED is on. See "Unsaved Data in the Controller Cache" on page 295 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 261) and any amber or red LEDs (see page 262).

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:

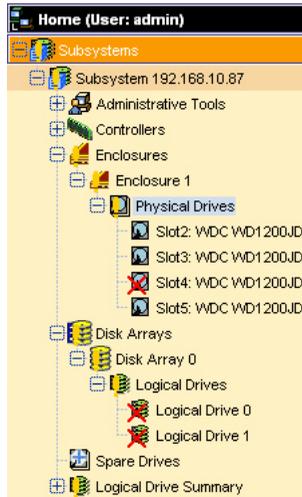
- Highlight *Physical Drives in the Array* and press Enter to identify the failed disk drive

- Highlight *Rebuild* and press Enter to rebuild the array after you replace the failed disk drive

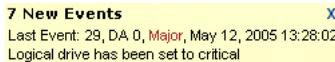
For more information, see “Critical & Offline Disk Arrays” on page 286.

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 ! and red Xs in Tree View (above)
- Sends email messages, per your configuration



- Displays popup messages, per your configuration (above)

Thu, May 12, 2005 13:30:50						Max Events Display: 10
#	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	0x000D000B	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

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	1GB
Physical Capacity	1.50GB
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	939860251180927000000000000000
WWN	225d-0001-55e3-cb9c
Synchronized	Yes

- Displays full information on the selected component in the Management Window (above)

Also see these troubleshooting topics:

- “Event Notification Response” on page 271
- “Critical & Offline Disk Arrays” on page 286
- “Frequently Asked Questions” on page 297

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 77) 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 271)
- Blowers (page 272)
- Cache (page 273)
- Controller (page 273)
- Disk Array (page 273)
- Drive Interface Controller (page 273)
- Enclosure (page 274)
- Event Log (page 274)
- Host Interface Controller (page 274)
- Fibre Channel (page 276)
- iSCSI (page 276)
- Logical Drive (page 276)
- Media Patrol (page 277)
- Online Capacity Expansion (page 277)
- PDM (page 278)
- Physical Disk (page 278)
- PSU (Power Supply Units) (page 280)
- PSU Fans (page 280)
- RAID Level Migration (page 281)
- Rebuild (page 282)
- Redundancy Check (page 282)
- Resource (page 283)
- Spare Check (page 283)
- Spare Drives (page 283)
- SMART (page 283)
- Stripe Level Migration (page 284)
- Synchronization (page 284)
- System (VTrak) (page 285)
- Transition (page 285)
- Watermark (page 285)

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 230 or page 233.
Battery temperature is normal	Normal.
Battery capacity is below the threshold	Battery is drained. Run battery reconditioning. See page 121.
Battery capacity is normal	Normal.
Battery is discharging	Battery is undergoing reconditioning.

Event	Action
Battery is charging	Battery is being recharged.
Battery reconditioning is complete	Battery reconditioning is finished.
Battery is malfunctioning	Run battery reconditioning. See page 121. If this message reappears, replace the battery.
Battery reconditioned successfully	Battery reconditioning is finished.
Battery reconditioning has failed	Replace the battery. See page 230or page 233.
Battery is reaching end of life	Replace the battery. See page 230or page 233.
Battery is removed	The battery was disconnected or removed. Reinstall the battery. See page 230or page 233.
Battery charging failed	Replace the battery. See page 230or page 233.
Battery reconditioning started	Battery reconditioning has begun.
Battery recondition terminated	The battery was disconnected or removed during reconditioning. Reinstall the battery. See page 230or page 233.
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 221 or page 226.
Blower speed is increased	Check the VTrak for overheating. See page 289.
Blower speed is decreased	Temporary overheat condition was corrected.
Blowers are NOT functioning	Replace the blowers. See page 221 or page 226.
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 221 or page 226.
Blowers are functioning normally	Normal.

Event	Action
Blowers are NOT installed	Reinstall the cooling unit(s). If the blowers does not turn, replace the blowers. See page 221 or page 226.
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 flush. Check your cache flush interval setting. See page 116.
Controller	
The controller parameter(s) changed by user	The user successfully change controller settings. See page 116.
The controller has new crash information	Check the event logs. See page 70.
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 135.
Drive Interface Controller	
Drive-interface controller found	Normal.

Event	Action
Drive-interface controller is NOT found	Restart the VTrak. See page 218. If this message appears repeatedly, contact Technical Support. See page 299.
Drive-interface diagnostics has passed	Normal.
Drive-interface diagnostics has failed	Restart the VTrak. See page 218. If this message appears repeatedly, contact Technical Support. See page 299.
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 299.
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 parity/data parity/command parity error	A FC/iSCSI error occurred. If this message appears repeatedly, contact Technical Support. See page 299.

Event	Action
Host-interface controller has detected bus reset	The initiator sent a reset command. If this message appears repeatedly, contact Technical Support. See page 299.
Host-interface controller has encountered an unrecoverable error	Restart the VTrak. See page 218.
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 299.
Host-interface controller has received a LUN reset command.	Result of user action. Normal.
Host-interface controller is informed that the initiator detected an error.	A FC/iSCSI error occurred. If this message appears repeatedly, contact Technical Support. See page 299.
Host-interface controller has received illegal secondary identification	A FC/iSCSI target received a second identify message with a different LUN. If this message appears repeatedly, contact Technical Support. See page 299.
Host-interface controller has received a message parity error	A FC/iSCSI message parity error. If this message appears repeatedly, contact Technical Support. See page 299.
Host-interface controller has received a bus reboot	The VTrak rebooted itself. If this message appears repeatedly, contact Technical Support. See page 299.
Host-interface controller has encountered an unknown error	An unidentified error occurred. If this message appears repeatedly, contact Technical Support. See page 299.
Host-interface controller has encountered a system error	A VTrak system error occurred. If this message appears repeatedly, contact Technical Support. See page 299.
Host-interface controller has encountered a fatal error	Restart the VTrak. See page 218. If this message appears repeatedly, contact Technical Support. See page 299.

Event	Action
Host-interface controller settings have changed	Result of user action. Normal.
Fibre Channel	
Fibre Channel controller has detected bus reset	The initiator sent a reset command. If this message appears repeatedly, contact Technical Support. See page 299.
Fibre Channel controller has received a LUN reset command.	Result of user action. Normal.
Fibre Channel controller has encountered a fatal error	Restart the VTrak. See page 218. If this message appears repeatedly, contact Technical Support. See page 299.
Fibre Channel link is up	FC link connected and ready. Normal.
Fibre Channel link is down	FC link disconnected or otherwise not working.
Fibre Channel controller settings have changed	Result of user action. Normal.
iSCSI	
iSCSI link is up	iSCSI link connected and ready. Normal.
iSCSI link is down	iSCSI link disconnected or otherwise not working.
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 16 and page 135.

Event	Action
Logical drive initialization is aborted due to an internal error.	System resources are low. Reduce system load or restart the VTrak. See page 218.
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 286.
Logical drive has been set to critical.	One or more physical drives in the array went offline. See page 286.
Logical drive axle has been placed online	RAID 50. One of the axles (RAID 5 arrays) returned on online status.
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 218.
Media patrol is queued	Media patrol has been set manually or by schedule.
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.

Event	Action
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 147.
Online capacity expansion is aborted due to an internal error.	System resources are low. Reduce system load or restart the VTrak. See page 218.
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
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.

Event	Action
Physical disk is marked online	Disk drive removed from service due to errors. If necessary, try to force the disk online. See page 127 or page 181.
Physical disk is marked as dead.	Disk drive failure. Replace the disk drive. See page 16.
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	A disk drive has been inserted into the VTrak subsystem.
Physical disk has been removed	A disk drive has been removed from the VTrak subsystem.
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.
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.

Event	Action
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.
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.
PSU is installed/ operational and turned on	Normal.
PSU is installed/ 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 220.

Event	Action
PSU fan speed increased.	Check the VTrak for overheating. See page 289.
PSU fan speed decreased.	Temporary overheat condition was corrected.
PSU fan is malfunctioning	Replace the power supply. See page 220.
PSU fan is functioning normally	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.
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 147.
RAID Level migration is aborted due to an internal error.	System resources are low. Reduce system load or restart the VTrak. See page 218.
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 137. If array is offline, delete and recreate array. See page 132 and page 131.

Event	Action
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 138.
Rebuild stopped internally	The logical drive is offline. See page 286.
Rebuild is aborted due to an internal error.	System resources are low. Reduce system load or restart the VTrak. See page 218.
Rebuild is queued	Rebuild has been set manually or by schedule.
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 218.
Redundancy Check encountered inconsistent block(s)	Check the logical drive's inconsistent block table. See page 147. Rebuild the disk array if necessary. page 138.

Event	Action
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 286.
Resource	
Resource is NOT available	System resources are low. Reduce system load or restart the VTrak. See page 218.
SEP (Storage Enclosure Processor)	
SEP is not found	Verify that the SEP is properly installed. See page 235 or page 236.
SEP is found	Normal.
Spare Check	
Spare check started on the given spare drive	Result of settings or user action. Normal.
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.
SMART	
SMART error is received	A disk drive reported a SMART error. If this message appears repeatedly, replace the disk drive.

Event	Action
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 147.
Stripe Level migration is aborted due to an internal error.	System resources are low. Reduce system load or restart the VTrak. See page 218.
Stripe Level migration is queued	Migration has been set manually or by schedule.
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 218.

Event	Action
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.
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 137. If array is offline, delete and recreate array. See page 132 and page 131.

Critical & Offline Disk Arrays

A fault-tolerant disk array—RAID 1, 1E, 5, 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, 10, and 50—goes *offline*, contact Promise Technical Support. See “Contact Technical Support” on page 299.



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 262.
- The Disk Carrier Status LED changes from green to red. See page 264.
- The audible alarm repeatedly sounds two short beeps. See page 261.
- WebPAM PROe reports the condition. See page 269.

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 151 (WebPAM PROe) or “Create New Spare Drive” on page 202 (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 71 (WebPAM PROe) or page 200 (CLU).

To set Hot Spare Policy, see page 150 (WebPAM PROe) or page 202 (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 126 (WebPAM PROe) or “Clear Stale and PFA Conditions” on page 180 (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.

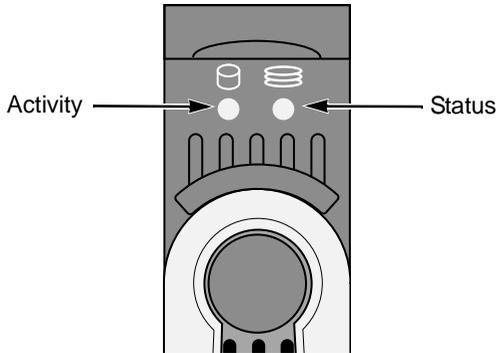


Figure 4. VTrak M500f/i/p disk carrier LEDs

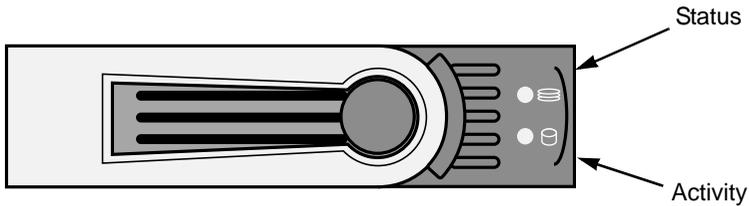


Figure 5. VTrak M300f/i/p and M200f/i/p disk carrier LEDs

- 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 ⚠️ 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).

Service Enclosure Processor Polling Point	Healthy Operating Threshold Range	Fan Status	Current Polled Value
Power Supply Fan 1	>3750 RPM	OFF	0 RPM
Power Supply Fan 2	>3750 RPM	ON	5720 RPM

In this example, a power supply fan has stopped turning, indicating a failure. The Enclosure Diagram displays color and motion changes to identify a failed fan. In this case, you must replace the power supply.

Overheating

Temperature Sensors



Overheating



Too Warm



Normal

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

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

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



Replace Now

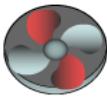
No tools are required for either procedure. See page 221 for instructions on replacing the fans.

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



Replace Now

- 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

To cool down a VTrak, do the following:

- Correct any problems identified above
- Power it down and let it sit for an hour or longer

Power Supplies



OK

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.



Replace Soon

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.



Replace Now

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 220 for instructions on replacing a power supply.

Battery

Battery
Condition

OK

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.



Replace Soon

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.



Replace now

No tools are required for the procedure. See page 230 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.

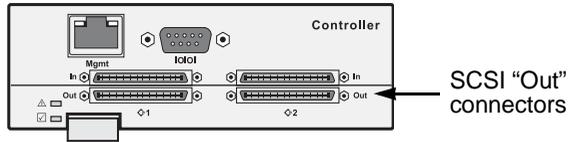
VTrak makes use of SCSI Target IDs (TIDs) and Logical Unit Numbers (LUNs) to enable multiple VTrak arrays managed by a single Host PC

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 95 or "Channel Settings" on page 198.



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.

iSCSI Connections

A recent variation of the SCSI interface is Internet SCSI (iSCSI), which converts SCSI commands to TCP/IP commands for communication over a network. VTrak uses two Gigabit Ethernet network connections to move data under the iSCSI protocol. The iSCSI ports will accept IP address assignments from a DHCP server. Also, you can use WebPAM PRO for the initial setup.

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.

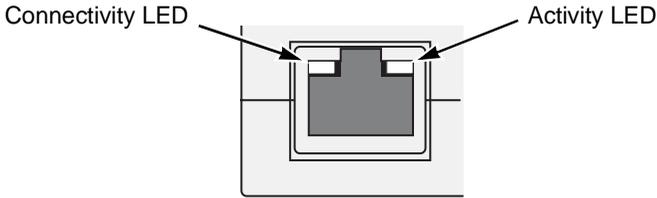
For VTrak, you must use the CLI or CLU to set the Management Port IP address in order for WebPAM PROe to connect with it. See "VTrak Setup with CLI or CLU" on page 29. This issue is discussed further under Network Connections (below). See the "Set Up Serial Cable Connections" on page 25 for more information 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 29.



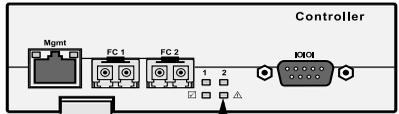
LEDs	State			
	Dark	Amber	Green	Flashing Green
Connectivity	10BaseT	1000BaseT	100BaseT	n/a
Activity	No activity	n/a	n/a	Activity

“n/a” means this state does not apply to this LED.

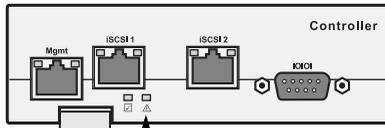
Note that VTrak Management Port can accept IP address assignments from a DHCP server. Use VTrak's Command Line Utility (CLU) to enable this feature. If you have not activated DHCP support but there is a DHCP server on your network, there is a chance that it will inadvertently assign the VTrak's Management 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

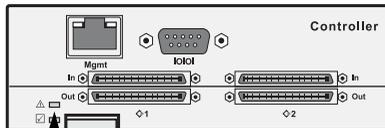
The VTrak M-Class controller has a 256 MB data memory cache protected by a battery backup. If there is a power failure while unsaved data is in the cache, the battery will power the cache and hold the data up to 72 hours.



Dirty Cache LED (Fibre Channel)



Dirty Cache LED (iSCSI)



Dirty Cache LED (SCSI)

An LED (marked with the \triangle 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.

If a power failure has occurred and there is unsaved data in the controller’s cache, the Dirty Cache LED shines amber. During this time, do NOT remove the cooling unit (M300f/i/p or M200f/i/p) or the cooling unit with the battery (M500f/i/p). Wait until power service is restored. After the VTrak reboots completely, the data will be saved automatically and the LED will go dark.

If you have turned off the power manually, turn the power on again and allow the VTrak to boot itself completely. Then the data will be saved automatically and the LED will stop flashing.

Chapter 9: Support

- Frequently Asked Questions (below)
 - Contact Technical Support (page 299)
 - Limited Warranty (page 302)
 - Returning product for repair (page 303)
-

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 M-Class uses the industry-standard DDF and has a metadata-to-DDF conversion feature. To use the conversion feature, you must restart the VTrak M-Class after installing disk drives from an older system.

If you plan to move Parallel ATA (PATA) disk drives to VTrak M-Class, contact your Promise distributor to obtain PATA-to-SATA adapters. You must install an adapter onto the VTrak's drive carrier for each PATA disk drive you want to connect to VTrak's SATA disk drive interface.

Note that if you move the disk drives from the VTrak M-Class to the older subsystems, they will not recognize your disk array or logical drive.

Can I use my existing SCSI card with VTrak M-Class?

Yes, if your VTrak is a M500p, M300p or M200p model. However, for best performance results, use an Ultra320 SCSI card.

How can I tell when the VTrak has fully booted?

When the VTrak is fully booted up, the Power and FRU LEDs will light up green. If a disk array is present, the Logical Drive LED will light up green also. The Controller LED blinks five times, once per second; goes dark for ten seconds; then blinks five times again.

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 M-Class different?

VTrak M-Class has the server software embedded. With the M-Class, you point your browser directly to the VTrak rather than a server. Also, with M-Class 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 seven RAID 1 logical drives. Or you can create a single RAID 10 logical drive with data mirroring and up to 14 physical drives. If you have an odd number of drives but still want data mirroring, use RAID 1E.

See "Install Disk Drives" on page 16 and "Introduction to RAID" on page 239 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 250 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 M-Class.

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 286.

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

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

Germany

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

Italy

E-mail Support	support-it@promise-emea.com
Fax Support	0039 06 367 12400 Attn: Technical Support
Phone Support	0039 06 367 12626
If you wish to write us for support:	Promise Technology Italy Piazza del Popolo 18 00187 Roma, Italia

Taiwan

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

China

E-mail Support	support-china@promise.com
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.

Disclaimer of other warranties

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

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

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

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

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

- a) replace the product with a conforming unit of the same or superior product;
- b) repair the product.

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

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

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

Your Responsibilities

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

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).

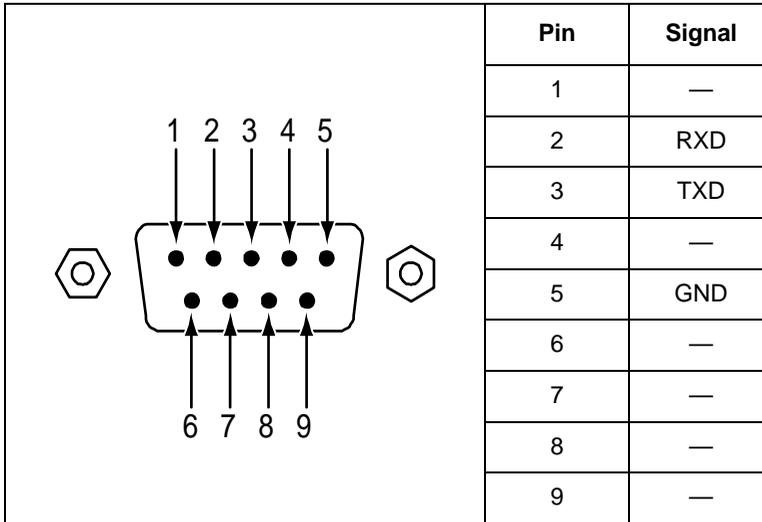
Appendix A: Useful Information

- Serial Connector Pinout (below)
- SNMP MIB Files (page 306)

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 M-Class 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`
- `PromiseRAIDV4Storage.mib`
- `PromiseRAIDV4System.mib`
- `FCMGMT-MIB.mib`
- `IF-MIB.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.

Compliance Statement

Promise VTrak M-Class Mx00f SNMP support is compliant to the IETF FC-MGMT MIB (RFC 4044) by implementing the following MIB groups:

- `ifGeneralInformationGroup`
- `ifVHCPacketGroup`
- `ifLinkUpDownNotificationGroup`
- `fcmInstanceBasicGroup`
- `fcmPortBasicGroup`
- `fcmPortStatsGroup`
- `fcmPortClass23StatsGroup`
- `fcmPortErrorStatsGroup`

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