Tableau Modular Storage System
User's Guide
Version 1.1
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Preface

This manual describes the Tableau TMSS modular storage system, which is designed to work with other Guidance Software products. The manual explains the procedures for assembling and configuring the device. It also provides technical information about the storage system, the Windows configuration procedures you use to initialize it, as well as frequently asked questions.

**TB and GB versus TiB and GiB**

This manual follows industry-standard conventions, where KB, MB, GB, and TB refer to powers of 10, and where Kib, MiB, GiB, and TiB refer to powers of two. The following table summarizes these units:

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Bytes</th>
<th>Units Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>$10^3$</td>
<td>1,000</td>
<td>1 KB</td>
</tr>
<tr>
<td>$2^{10}$</td>
<td>1,024</td>
<td>1 KiB (about 2.4% larger than 1KB)</td>
</tr>
<tr>
<td>$10^6$</td>
<td>1,000,000</td>
<td>1 MiB (about 4.9% larger than 1MB)</td>
</tr>
<tr>
<td>$2^{20}$</td>
<td>1,048,576</td>
<td>1 GiB (about 7.4% larger than 1GB)</td>
</tr>
<tr>
<td>$10^9$</td>
<td>1,000,000,000</td>
<td>1 GB</td>
</tr>
<tr>
<td>$2^{30}$</td>
<td>1,073,741,824</td>
<td>1 GiB (about 7.4% larger than 1GB)</td>
</tr>
<tr>
<td>$10^{12}$</td>
<td>1,000,000,000,000</td>
<td>1 TB</td>
</tr>
<tr>
<td>$2^{40}$</td>
<td>1,099,511,627,776</td>
<td>1 TiB (about 10% larger than 1TB)</td>
</tr>
</tbody>
</table>
Overview

- The Tableau TMSS
- Parts List
- Physical Layout
- Power Supply
The Tableau TMSS

The Tableau TMSS is a portable, modular storage system (MSS) capable of providing multiple terabytes of storage in a compact package. It supports four 3.5” hard disks in a RAID 5 (Redundant Arrays of Inexpensive Disks – Scheme 5) configuration, allowing for high throughput and fault tolerance.

A RAID 5 scheme distributes data over four hard disks, increasing the effective data transfer rate to approximately three times that of a single disk. Tableau’s RAID 5 set-up executes an efficient data redundancy scheme across its four disks, so that the failure of one disk does not result in a loss of data. In that situation, the system functions in a degraded state that can be restored to normal by replacing the failed drive and rebuilding the RAID 5 array.

The TMSS-IIO1 supports the following data transfer interfaces.

- Mini USB 2.0
- eSATA
- FireWire 800

Parts List

The TMSS-IIO1 kit contains the following parts:

- Storage module, partially assembled, with four types of screws. (Some units may ship fully assembled with the screws already in place.)
- Pack of ten Reference Card & Evidence Tag card inserts.
- Tableau TB1 cover.
- Tableau TP4 power supply. Besides US power cables, the power supply accepts standard 2-pin and 3-pin international power cables (100 to 240 VAC).
- Cables
  - TC7-9-9
  - TC8
  - TC9-2M
  - TCA7-4-9
  - TCA7-6-9
  - TC3-1M

The unit must first be fully assembled before it can be configured and rendered functional.

Physical Layout

Front Panel

The front panel of the TMSS-IIO1, shown below, contains a window for a completed Reference Card &
Evidence Tag. The bottom of the front panel contains the unit’s power switch and a set of LEDs.

- **Power switch** – Membrane type switch used to power the device on and off.
- **Power LED** – Lights green when the unit has been turned on.
- **Alert LED** – Flashes red when a hard disk is experiencing a failure.
- **Encrypt LED** – This feature is not currently available.
- **Host LED** – Lights green when the device is connected to a host system.
- **Activity LED** – Flashes red to indicate I/O activity.

**Rear Panel**

The unit’s rear panel contains three data transfer interface ports (eSATA, FireWire 800, and Mini-USB 2.0) used to connect the unit to a computer, and a USB flash drive port for future expansion. It also contains a socket for the DC end of the power supply (far-right port).
**Note:** There is an LED located to the immediate left of the DC power socket. If the power supply is properly connected to the device and functioning properly, this LED lights up green, whether or not the TMSS is powered on. If you are having difficulty turning on the device, first check the status of this LED to ensure that the TMSS is receiving power from the TP4 power supply.

### Power Supply

The TP4 power supply provided with the TMSS has the following voltage/current ratings.

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Current</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>+24VDC +/- 5%</td>
<td>5A</td>
<td>120W</td>
</tr>
</tbody>
</table>

These ratings are adequate to power the TMSS and most combinations of the four SATA hard disks. The TMSS also employs staggered power sequencing for the hard disks, which means the TMSS first applies power to one drive, then pauses before powering up the next drive, and so forth. It is normal to hear the source and destination drives powering up separately.

During power on, initialization, and self-test, the MSS checks the output voltages of the TP4 power supply. If the voltage is below the minimum specification (+5VDC or +12VDC), the device will turn off the internal power lines and flash the green **Power** LED next to the power input connector. If this happens, you can press the power button to turn off the unit and try again. If after a few attempts this continues to happen, there is a problem with the unit that requires repair.

### Hard Drive Selection

When selecting hard drives for your TMSS, consider the following:

The TMSS utilizes a RAID 5 configuration, so you should select hard drives of an identical size. A RAID 5 uses only the space on all of the hard drives that is equal to the available space on the smallest drive. That means that if one drive is smaller than the others, you will not benefit from additional space on the larger drives.

For optimal performance, select hard drives that are the same speed. SATA drives are commonly available in 5400, 7200, and 10,000 RPM models. The faster the drive, the faster data can be read and written; however, the faster the drive, the more heat it generates. Due to the limitations of the interfaces used to access the TMSS and the speed of the RAID 5, 7200 RPM drives are ideal, but you can also use both 5400 and 10,000 RPM drives.

The performance of a drive also varies with manufacturer, model number, and other factors. The overall performance is limited by the slowest drive, and is usually three times the performance of a single drive.

Depending on the type of speed and power performance required, select an appropriate drive. Drives that need more than 1A on each of the two power rails (5V and 12V) may not work or may overheat. The power utilization is usually noted on the drives.

Even though using four identical drives gives the most predictable size and performance, there may be good reason to select different manufacturer and model numbers. Since the RAID 5 array can tolerate the loss of one drive, a manufacturing defect in one particular type of drive would result in the loss of just the one drive. The remaining three drives are able to keep the data intact, thereby lowering the probability of data loss.
CHAPTER 2

Assembling the TMSS

- Assembling the TMSS
Assembling the TMSS

The TMSS is sold both as a ready-to-use unit with hard drives already installed, and as a bare system without drives. You can easily install and service the internal hard drives with only a #2 Philips screwdriver. If you purchased your unit with drives already installed, you can skip this section.

When you unpack your unassembled TMSS, you will find the partially assembled enclosure and four bags of screws. Follow these steps to install the hard drives into the unit.

1. Verify that the kit contains the four types of the screws shown below. You will need all of these screws when reassembling. Screws (C) arrive pre-installed, connecting the two metal cages of the unit together for stability during shipping.

   ![Screws](image1)

   **A**  **B**  **C**  **D**

2. Holding the base of the unit with one hand, remove the top half of the case by grabbing the top handle and lifting it off of the base. The top case slides off easily, as there are no screws attaching it to the base when it arrives unassembled.

3. Carefully remove the metal hard drive cage by pulling it straight up from the base.

4. Remove the eight M3x4 screws (C) connecting the two pieces of the metal cage. There are four screws on each side of the unit.

   ![Metal Cage](image2)

   Keep the eight screws (C) separate from the others. You will use them later to reassemble the metal cage. Separate the two pieces of the metal cage by sliding them apart.

5. Install four SATA hard drives into the back plane in the metal cage.

   ![SATA Drives](image3)

   Align the SATA drives vertically, on their sides, and slide each forward between the alignment tabs in the cage. Gently insert the drives until each one attaches firmly to the SATA connector on the back plane. To attach the hard drives to the metal bracket, use the 16 #6-32 machine screws (D).
Note: Do not tighten the hard drive screws; leave them loose, until the next step is completed, to ensure easy alignment of the second half of the cage.

6. Slide the second half of the metal cage (removed in step 4) over the metal cage with the hard drives. Use the eight M3x4 machine screws (C) to secure the two brackets together.

7. Tighten all of the hard drive screws from step 5.

8. Attach the hard drive assembly to the base unit. Gently place the hard drive assembly on the base, verifying that the four metal posts and circuit board connectors are aligned properly. Press the assembly into the base until the circuit board connector is together.

The figure below shows the hard drive assembly installed on the base.
9. Slide the top part of the case over the hard drive assembly and on to the base unit. Attach the top with the six black M5x25 machine screws (A).

10. While holding the top of the case to the base, gently lay the unit on its side and attach its base, using the four black M3x8 machine screws (B).

The unit is now completely assembled and ready to be initialized. If it becomes necessary to replace any of the hard drives, disassemble the unit by following these instructions in reverse order.
CHAPTER 3

Installation and Configuration

- Overview
- TSM Software Installation
- Initializing the RAID Array
- Initializing the File System
Overview

This chapter covers three steps required to initialize the TMSS for use with various operating systems.

1. Installing the Tableau Storage Manager (TSM).
2. Using the TSM to initialize the RAID array.
3. Configuring the array for use in Windows.

TSM Software Installation

You need to initialize the RAID array for the TMSS to use all of the available hard drives. Initialization is handled by the Tableau Storage Manager (TSM) software, which can be installed on Windows XP systems or higher.

To download TSM, go to www.tableau.com. Click Products > Software, and click the Tableau Storage Manager icon. Then click the Free Download! link. Or go directly to the download page at: http://www.tableau.com/tsm

To install TSM, perform the following steps:

1. Locate the file that you downloaded above.
2. Double click the file to launch the installer.
3. Click Next on the introduction screen.
4. Set the install location by accepting the default path or entering an alternate location, and click Next.
5. Click Install.
6. Once the installation has completed, click Finish.

Initializing the RAID Array

After installing TSM, connect the unit to the host computer via any of the three available interfaces, and power on the device by pressing the power button. Launch the TSM software by double clicking the desktop icon. Once the TMSS has completed its power-up cycle, the device, along with associated information, displays. The TSM software scans for newly attached devices every few moments. If a fully powered-up device is not shown, you can select Actions > Rescan Devices to manually check for additional devices.

Note: You can configure several storage arrays at one time. If multiple devices are attached to the system and powered up, each will display in the TSM software.
1. Select the appropriate TMSS device by clicking it, which highlights it in blue.
2. From the tool bar, select **Actions > Initialize RAID**.
3. In the subsequent dialog, click **Yes** to initialize. The initialization should take less than one minute to complete and will destroy any data previously stored on the hard drives.

Once the process has completed, the array will be initialized as a RAID 5 and appear in the software, as seen in the following figure.

**Note:** When the hard drives are configured in a RAID 5, approximately 25% of the storage capacity of the four internal hard drives will be used for data redundancy, and will therefore not be counted in the overall RAID capacity.
Initializing Large RAID Sets

The TMSS is capable of revealing many terabytes of storage to the host computer. Unfortunately, older operating systems, including Windows XP, cannot correctly manage a single disk with a capacity in excess of 2.2TB (2^{32} sectors). Even modern operating systems can only support large disks correctly when the manufacturer of the host adapter card has provided drivers which are large-disk aware. Non-compliant drivers are common, particularly for eSATA adapters (Microsoft briefly documents this issue at: http://support.microsoft.com/kb/981627).

If a host computer has an older OS or a non-compliant storage driver, then connecting a large disk to that computer typically causes the OS to see a disk with a capacity that is too small. This situation will most likely cause corruption of data stored on the large disk, often without warning.

When a TMSS is equipped with a set of drives that could yield a RAID 5 capacity larger than 2.2TB, the same risks are present. To minimize the danger of data corruption, the TSM allows you to limit the capacity of the RAID at the time a new RAID set is initialized. After confirming that a TMSS RAID set is to be initialized, the following dialog appears:

You can choose from among three options to set the capacity of the RAID:

- **Limit Capacity to 2.2TB.** This is a safe option, allowing even older operating systems to correctly support the TMSS.

- **Limit Capacity to Multiple of 2.2TB.** This option makes it possible to initialize a RAID with a capacity of 4.4TB, 6.6TB, etc. When a TMSS is initialized in this fashion, and is attached to a host computer in a configuration that does not support large disks, the OS will typically see the TMSS as a disk with a capacity of 0 bytes. This is a relatively benign error, as the OS cannot read or write the data stored on the TMSS disks, so the risk of data corruption is minimal.

- **Maximize Capacity.** This option initializes the TMSS with the largest possible RAID capacity. A TMSS initialized in this fashion should be used only with modern operating systems and host adapter drivers known to support large disks.
Initializing the File System

After you have initialized the RAID array using the TSM software, you need to initialize a file system on the device. This can be done in different operating systems, but the information below details preparing the file system in Windows.

It is recommended that you use a version of Windows that supports NTFS or GPT. This allows you to configure file systems that are not limited to the 2TB limitations of FAT32.

1. From the Windows Run dialog, type diskmgmt.msc, and press Enter.
2. Identify the TMSS in the Disk Management utility and right click the disk label (Disk 1 in the example below).
3. Select Initialize from the dialog.
4. You are now ready to create a volume on the array. Right click the graphical view of the drive and select New Partition from the dialog. This opens the Wizard to guide you through partitioning the drive.
5. Once you click Finish in the Wizard, Windows recognizes the drive. You can now write data to it.

Note: When determining how many volumes to create on your array and what file system to use, consider how you will be using the device and what types of operating systems you wish to read and write to the device.
Using the TMSS

- Overview
- Determining Which Data Transfer Interface to Use
- Using Reference Card and Evidence Tags
Overview

This chapter guides you in determining which interface to use, and how to use the Reference Card & Evidence Tag.

Determining Which Data Transfer Interface to Use

The TMSS is equipped with three data transfer interfaces to choose from to connect the device to the host computer. Since many outside factors can affect the performance of each interface, you should consider the advantages of each. The interface hardware on the host computer, the upstream data paths, processor speed, and so forth are all factors to take into account.

The following is a brief technical description of each interface.

- **eSATA** is the fastest performing interface on the TMSS. It is compatible with both 1.5Gb/s and 3Gb/s SATA standards. eSATA also uses 8b/10b encoding, reducing the actual transfer rate to 1.2 or 2.4Gb/s, or 150 or 300MB/s, respectively. Although eSATA facilitates the fastest transfer rate, the availability of eSATA ports are not as common.

- **FireWire 800** is approximately one third the speed of eSATA, but provides a significant performance improvement over USB. The actual data rate is about 983Mb/sec, but the overhead of 8b/10b encoding reduces throughput to about 786Mb/sec, translating to a theoretical maximum of 98.3MB/sec. As with eSATA, FireWire 800 ports are not as readily available as USB. Although an adapter for FireWire 400 is provided, the use of FireWire 400 is not recommended, due to significant data transfer limitations.

- **Although the USB 2.0 interface has the lowest performance**, it is the most readily available on modern computers. USB 2.0 operates at a data rate of 480Mb/s, corresponding to 60MB/sec. However, due to protocol overhead, 40MB/s is the theoretical maximum.

Using Reference Card and Evidence Tags

The TMSS comes with ten Reference Card and Evidence Tags, designed to keep usage information with each device. (They can be reordered from your Tableau reseller, or downloaded in PDF from http://www.tableau.com/refills.) Insert a card in the slot in the top of the device so it becomes visible through the window on the front. Remove the card by sliding it up from the window.

Use one side of the card as an evidence tag to identify what information is stored on the device and to record overall usage information.
The card provides areas for the following information:

- In-service date
- Organization name
- Asset number
- Device-specific information, such as hard drives and capacity
- Case-specific information, including case number, date, examiner initials, and data size

The reverse side of the card contains reference information, including where to get support.
System Maintenance

- Monitoring RAID Array Health
- Diagnosing a RAID Failure without TSM
- When a Hard Drive Fails
- Updating the Firmware
Monitoring RAID Array Health

There are two ways to monitor the health of the RAID Array:

- Checking the Alert LED on the front of the unit.
- Checking Device Information within the TSM software.

The RAID electronics in the TMSS constantly monitor the health of the hard drives that make up the array. If one or more of the drives starts to fail, the Alert LED on the front panel flashes red. If this happens, analyze the RAID array using the TSM software to determine the nature of the failure.

The TSM software provides valuable information about the health of the array and the individual drives that make up the array. This information is available whenever you want to check the status of the individual drives, including after the Alert LED activates. After running the TSM software, as described in Chapter 3, select the Actions > Device Information from the tool bar. This displays the Configuration and Status Report tabs, shown below.
The **Configuration** tab displays both Device Configuration and Drives Configuration information that can be extremely helpful when determining the reason that the Alert LED is flashing. The tab includes the status of the RAID array and the status of each individual hard drive. The **Status Report** tab includes similar information in a format that you can print, export to a file, or copy to the clipboard by using the buttons at the bottom of the dialog.

### Diagnosing a RAID Failure without TSM

When the RAID array is not viable (uninitialized or multiple disk failure), the TMSS presents a virtual 16MB read-only FAT32 volume visible to a host system. This disk has a label of TMSS STATUS and can be viewed in any operating system that supports FAT32.

In the FAT32 volume, there will be a single HTML file called README.HTM. This file contains the same information as the **Status Report** tab in the TSM software. The first paragraph gives a summary of the system status. Following that is information on each of the disks in the system. If a disk has failed, it may be reported as Failed or not show up at all.

Be aware that this report is only available while the TMSS is powered on and is not saved at shutdown. If you wish to save the report, copy it to the host system prior to shutdown.

### When a Hard Disk Fails

Once you have identified a drive failure (or potential drive failure), immediately replace the affected drive and rebuild the array to prevent data loss. When a single hard drive fails, you can replace it and rebuild the RAID array without any loss of data. If a second hard drive fails prior to rebuilding the array, data loss will occur.

After determining that a drive needs replacing, disassemble the TMSS by following in reverse the assembly steps in Chapter 2. Replace the affected drive and reassemble the unit, as described. Connect the TMSS to a system running the TSM software, as described in Chapter 3, and then:
1. Click the appropriate TMSS device to select it.
2. From the tool bar, select Actions > Rebuild RAID.
3. In the subsequent dialog, click Yes to rebuild. Rebuilding the array will take a significant amount of time, as the missing data must be reconstructed from the parity information contained on the remaining drives.

**Note:** The Rebuild RAID menu option is available only if the software detects that a drive within the system is not part of the current array, and that there is sufficient information to attempt to rebuild the missing data.

**Updating the Firmware**

You will receive specific instructions on how to update the firmware on the TMSS when it becomes necessary to do so. Firmware updates are applied using the Tableau Firmware Update (TFU) utility, and can only be done through the FireWire connection on the TMSS.
FAQs

I’m using Windows 7 and writing to the TMSS is slow. Why?

By default Windows 7 disables disk-level write caching for removable storage devices, which can dramatically reduce write performance. You can change the default disk-level write cache setting in Windows 7 by performing these steps:

1. Use the Device Manager to open the Properties dialog for the TMSS, and then select the Policies tab.
3. Under “Write caching policy,” check “Enable write caching on the device.”

Note: The default behavior for the TMSS is to enable its disk-level write cache for improved performance. Older versions of Windows, e.g., Windows XP, do not override this setting.

How do I know if I have a bad hard disk?

The TMSS indicates bad or failing hard disks in several different ways. The Alert LED on the front of the TMSS unit blinks. When this happens, connect your TMSS unit to a Windows-based computer and run the Tableau Storage Manager (TSM) application. TSM will interrogate the TMSS unit and display detailed status indicating the nature of the problem. If you have a bad or failing hard disk, TSM will identify the faulty drive.

My TMSS appears to mount correctly, but I only see a FAT32 partition with a single README.TXT file in the root directory. Where is my data?

The TMSS has a unique diagnostic capability. When the unit is unable to initialize an operable (or degraded) array, it creates a “phantom” disk image with a single README.TXT file. The README.TXT file contains the full operating status of the array and can be viewed with any text editor. This feature makes it possible for you to diagnose the TMSS without the need to run the TSM application. This is especially useful when using TMSS units on a non-Windows platform like OS X or Linux.

Can I use any type of hard disk in my TMSS?

The TMSS supports 3.5” SATA hard disks with the “unitized” SATA signal and power connector. The unit is designed to supply up to 1A continuous current on each of the +5VDC and +12VDC power lines for each hard disk (up to 4A total continuous current on each voltage when four drives are in use). The TMSS is designed to supply up to 2A spin-up current on each of the +5VDC and +12VDC power lines. The TMSS sequences the spin-up of each drive, and this ensures that only one drive is drawing spin-up current at any one time. The TMSS does not provide +3.3VDC to the hard disks. These ratings are summarized in the following table:

<table>
<thead>
<tr>
<th>Continuous Operation</th>
<th>+3.3V DC</th>
<th>+5V DC</th>
<th>+12V DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Each Drive</td>
<td>n/a</td>
<td>1A</td>
<td>1A</td>
</tr>
<tr>
<td>Four Drives (total)</td>
<td>n/a</td>
<td>4A</td>
<td>4A</td>
</tr>
</tbody>
</table>

**Spin-Up**

<table>
<thead>
<tr>
<th>Spin-Up</th>
<th>+3.3V DC</th>
<th>+5V DC</th>
<th>+12V DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Each Drive</td>
<td>n/a</td>
<td>2A</td>
<td>2A</td>
</tr>
<tr>
<td>Four Drives (total)</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>
Do I need to use four identical hard drives in the TMSS?

No, you do not need to select four identical hard drives. However, you should probably use drives which are similar in capacity as the size of the array will be determined by the smallest of the drives installed. For example, if you install one 1TB drive and 3 1.5TB drives, the TMSS controller will use only the first 1TB of each drive when building the array.

Theoretically there is an advantage in using different makes and models of hard drives when building a fault-tolerant array like TMSS. If you use identical drives, then it is possible that the drives may have a common design or manufacturing fault. If that is the case, then two or more drives may fail at a similar rate. While TMSS can handle the failure of any one drive, it cannot recover from the simultaneous failure of two or more drives. Using different makes and models of hard drives when building an array reduces the likelihood that two or more drives will fail at about the same time.

How do I determine the effective capacity of the TMSS?

TMSS uses a RAID 5 configuration for fault tolerance. This means that the capacity of the array is one drive less than the number of drives installed. If you put four drives of identical capacity in the unit, the effective capacity is that of three drives. Also, the TMSS controller is limited to using the capacity of the smallest drive in the array. If the drives in a given unit vary in size, the effective capacity will be three times that of the smallest drive in the unit. The TMSS application can display capacity information for each drive and for the full array.

My effective capacity should be xxTB, but I’m only seeing 2TB. Why?

Some host computers and devices do not work correctly with disks larger than 2TB. In fact, some older hosts corrupt the data on a device larger than 2TB. To give you maximum flexibility when dealing with older hosts, TMSS units can be configured or initialized at full capacity or at a capacity which is artificially limited to 2TB, or a multiple thereof.

For further information on this topic, please refer to "Initializing Large RAID Sets."

What hosts are limited to 2TB?

This is a hard question to answer completely. Generally, older 32-bit operating systems like Windows XP will not handle drives with more than 2^32 – 1 sectors, or the biggest sector number that can be represented in 32 bits (roughly 4 billion sectors). When using 512-byte sectors, this results in a 2TB drive-size limit. For a variety of technical and compatibility reasons, TMSS units will only use 512 byte sectors. So, any operating system or driver which handles only 32-bit sector numbers will be subject to the 2TB limit.

Even if you are using a modern operating system, certain device drivers from independent hardware manufacturers (e.g., some eSATA add-in card manufacturers) will not correctly handle sector number larger than 32-bits. We recommend you specifically check to make sure your operating system and device drivers correctly handle drives larger than 2TB.

I’m using eSATA to connect the TMSS to the host computer, but I’m not seeing the drive. Everything seems fine when I use FireWire/1394 or USB. What’s wrong?

Some eSATA (and SATA) interfaces and drivers do not handle hot-swapping well. If you have an eSATA interface/driver that does not automatically recognize your TMSS, you may need to force the host operating system to re-detect devices.

Can I change the RAID configuration?

No, the TMSS is specifically designed to use a RAID 5 configuration for fault tolerance. This cannot be changed by the user.
May I use/install fewer than four drives in the TMSS unit?
No, you must install a full complement of four drives in each TMSS unit.

What happens when a drive fails? Can I still read and write to the TMSS?
Yes. When one of the four drives fails, the TMSS enters a degraded mode of operation. You will still be able to read and write data on the unit, but performance will be significantly reduced. Additionally, the longer you run a unit in the degraded mode the higher your chances of a second drive failure. If a second drive fails before you replace the first drive (and initiate a RAID re-build), you will permanently lose access to information stored on the TMSS.

I’m using a Tableau TD1 duplicator. Will it work with the TMSS?
Yes, the Tableau TD1 duplicator will work with the TMSS. However, the TD1 can only use the first 2TB of the TMSS. Future Tableau brand duplicators will be able to use TMSS units with more than 2TB of effective capacity.

Can the TMSS be updated in the field?
Yes, the TMSS is fully supported by the Tableau Firmware Update (TFU) utility. You will be able to use TFU to update the firmware in TMSS units in the field as new versions of firmware are released. Note that TFU uses the FireWire/1394 connection on the TMSS to apply firmware updates. You will need a FireWire/1394 connection and a Windows-based PC to apply firmware updates to the TMSS in the field.

Does the TMSS have a power save or sleep mode?
Yes. The TMSS spins-down when so requested by the host operating system.  

Note: The TMSS does not turn off the cooling fans when spinning down. Dynamic fan speed control and power-down will be enabled in a future firmware release.

How do I turn off the unit?
Press and hold the power button on the front of the TMSS for one second to turn the unit off. Note that when turning the unit on, you do not need to hold the power button; a brief touch of the power button is sufficient.

Where can I get the Tableau Storage Manager (TSM) application?
The TSM application is a free download from the Tableau web site. Please visit the product page for TSM at http://www.tableau.com/tsm.

Where can I get more evidence tags?
Please visit http://www.tableau.com/refills for information on ordering evidence tag refills.

Can I print my own evidence tags?
Yes, a standard 3x5” index card will fit in the evidence tag slot on the front of the unit. We provide a Microsoft Word template compatible with Avery® 5388™ white index cards so you can print your own evidence tags.

Can I encrypt the contents of the TMSS?
The TMSS is designed with encryption hardware. However, the firmware does not yet enable the encryption capability.
Tableau Modular Storage System
Support

If you have problems using the TMSS, please visit the support pages on Tableau’s Web site http://www.tableau.com/support.

Here you will find answers to common questions, information regarding specific compatibility issues, and firmware updates for your TMSS.

E-mail support for the TMSS is available through support@tableau.com.