StorageTek™

VolSafe

Software Information Guide

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StorageTek™

VolSafe

Software Information Guide

Release 2.0

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About this Guide

This guide describes software requirements and guidelines for utilizing the VolSafe cartridge feature on Sun StorageTek™ tape drives with the Host Software Component (HSC), Automated Cartridge System Library Solution (ACSLS) and Application Storage Manager (ASM). VolSafe functions with all currently supported releases of the HSC (including the Nearline Control Solution), and ACSLS.

Intended Audience

This guide is intended for customers implementing the VolSafe feature on Sun StorageTek tape drives. The tape drives do not have to be in a library for VolSafe to function. The information presented is of primary interest to system programmers responsible for installing VolSafe prerequisites in the HSC, ACSLS, and Application Storage Manager and integrators planning changes to applications to implement VolSafe.

How this Guide is Organized

This guide contains the following chapters and appendices:

- **Chapter 1, "Introduction"** provides an overview of the VolSafe Cartridge Solution.
- **Chapter 2, "Interfacing VolSafe with a User Application"** describes the primary reason for development of VolSafe, potential concerns about VolSafe operating with user applications along with suggested responses for concerns, and basic information about the Application Storage Manager (ASM).
- **Chapter 3, "Using VolSafe with the Host Software Component (HSC)"** provides pertinent software information for using the VolSafe cartridge feature for Sun StorageTek tape drives in conjunction with HSC software.
- **Chapter 4, "Using VolSafe with Automated Cartridge System Library Software (ACSLS)"** provides an overview of considerations for using VolSafe cartridges with ACSLS, how to add VolSafe cartridges to an ACSLS-controlled library, defining and assigning VolSafe cartridges to a scratch pool, and how to request scratch mounts from a VolSafe scratch pool.
- **Appendix A, "VolSafe Site Survey"** is a customer survey form needed by Sun StorageTek Support to assist a customer when questions arise about using the VolSafe feature.

- **Appendix A, "Sample Code to Determine the Type of Media in a 9x40 or T10000 Drive (ESCON)"** is provided to assist a customer assemble a module to be called for media information when using the VolSafe feature (ESCON attached).
- **Appendix B, "Sample Code to Determine the Type of Media in a 9x40 or T10000 Drive (SCSI)"** provides pseudo code to detect media type in a SCSI attached tape drive.

Conventions Used in this Guide

Typographic

In the JCL examples in this guide, some fields appear in lower case. You must update these fields to match your installation requirements.

Symbols

The following symbols are used to highlight text in this guide:

Note: Information that may be of special interest to you. Notes are also used to point out exceptions to rules or procedures.

Warning: Information necessary to keep you from damaging your hardware or software.

Related Publications

The following publications contain information about specific topics relating to the use of the Automated Cartridge System Library Software (ACSLS), Application Storage Manager (ASM), and the Host Software Component (HSC).

ACSLS Publications:

- *ACSLS Installation, Configuration, and Administration Guide*
- *ACSLS Message*
- *ACSLS Product Information*

ASM Publications

ASM for S/390:

- *ASM for S/390 User Guide*
- *NearOAM User Guide*
- *NearArchive User Guide*
- *ASM/OAM User Guide*

ASM for UNIX:

- *ASM, ASM-QFS, and ASM-QFS-Standalone Storage and Archive Manager Guide*
- *ASM, ASM-QFS, and ASM-QFS-Standalone Filesystem Administrator's Guide*
- *ASM, ASM-QFS, and ASM-QFS-Standalone Installation and Configuration Guide*
- *ASM, ASM-QFS, and ASM-QFS-Standalone Disaster Recovery Guide*
- *ASM Remote Administrator's Guide*

ASM for Windows:

- *ASM for Windows Upgrade Guide*
- *ASM for Windows MediaStor System Guide*
- *ASM for Windows License Server System Guide*
- *ASM for Windows Getting Started Guide*
- *ASM for Windows Data Manager System Guide*

Nearline Control Solution (NCS) Publications:

- *NCS (MVS/HSC, LibraryStation, MVS/CSC) Installation Guide*
- *NCS User Exit Guide*
- *SMC Configuration and Administration Guide*

HSC Publications:

- *Host Software Component Configuration Guide for MVS*
- *Host Software Component Operator's Guide for MVS*
- *Host Software Component System Programmer's Guide for MVS*
- *Host Software Component Messages and Codes Guide for MVS*

LibraryStation Publications for the MVS-based Library Control Solution (LCS):

- *LibraryStation Configuration Guide*
- *LibraryStation Operator and System Programmer's Guide*
- *LibraryStation Messages and Codes Guide*

MVS/CSC Publications:

- *Client System Component Configuration Guide for MVS*
- *Client System Component Operator's Guide for MVS*
- *Client System Component System Programmer's Guide for MVS*
- *Client System Component Messages and Codes Guide*

9840 Publications

- *3590 Image for 9840 ESCON Guide*

Software Support Publications

- *Requesting Help from Software Support*

Additional Information

Sun Microsystems, Inc. (Sun) offers several methods for you to obtain additional information.

Sun's External Web Site

Sun's external Web site provides marketing, product, event, corporate, and service information. The external Web site is accessible to anyone with a Web browser and an Internet connection.

The URL for the Sun external Web site is: http://www.sun.com

The URL for Sun StorageTek™ brand-specific information is:
http://www.sun.com/storagetek

Customer Resource Center

The Sun StorageTek product Customer Resource Center (CRC) is a Web site that enables members to resolve technical issues by searching code fixes and technical documentation for StorageTek brand products. CRC membership entitles you to other proactive services, such as HIPER subscriptions, technical tips, answers to frequently asked questions, addenda to product documentation books, and online product support contact information. Customers who have a current warranty or a current maintenance service agreement may apply for membership by clicking on the Request Password button on the CRC home page. Sun employees may enter the CRC through the SunWeb PowerPort.

The URL for the CRC is http://www.support.storagetek.com

Partners Site

The StorageTek Partners site is a Web site for partners with a StorageTek Partner Agreement. This site provides information about products, services, customer support, upcoming events, training programs, and sales tools to support StorageTek Partners. Access to this site, beyond the Partners Login page, is restricted. On the Partners Login page, Sun employees and current partners who do not have access can request a login ID and password and prospective partners can apply to become StorageTek resellers.

The URL for the StorageTek Partners site is:
http://members.storagetek.com

The URL for partners with a Sun Partner Agreement is:
http://www.sun.com/partners/

Hardcopy Publications

Contact a Sun sales or marketing representative to order additional paper copies of this publication or to order other StorageTek brand product customer publications in paper format.

Customer Support

Customer support is available 24 hours a day, seven days a week, to customers with Sun or StorageTek maintenance contracts and to Sun employees. You can find additional information about customer support on the Customer Resource Center (CRC) Web site at: http://www.support.storagetek.com

Customer-initiated Maintenance

Customer-initiated maintenance begins with a telephone call from you to Sun Microsystems StorageTek Support. You receive immediate attention from qualified Sun personnel, who record problem information and respond with the appropriate level of support.

To contact Sun Microsystems StorageTek Support about a problem:

1. Use the telephone and call:

   ☎ **800.872.4786 (1.800.USA.4SUN)** (inside the United States)

   ☎ **800.722.4786** (Canada)

   For international locations, go to
   http://www.sun.com/service/contacting/solution.html
   for the appropriate telephone number

2. Describe the problem to the call taker. The call taker will ask several questions and will either route your call to or dispatch a support representative.

   If you have the following information when you place a service call, the process will be much easier:

Account name	
Site location number	
Contact name	
Telephone number	
Equipment model number	
Device address	
Device serial number (if known)	
Urgency of problem	
Fault Symptom Code (FSC)	
Problem description	

Sun’s Worldwide Offices

You may contact any of Sun’s worldwide offices to discuss complete storage, service, and support solutions for your organization. You can find address and telephone number information on Sun’s external Web site at:
http://www.sun.com/worldwide/

Chapter 1. Introduction

This chapter describes the Sun StorageTek VolSafe Feature, what it does, how it works and how to get your Sun StorageTek tape drives VolSafe enabled.

Warning: The VolSafe Feature must be enabled by a Sun StorageTek Customer Service Engineer (CSE). Before attempting to implement the VolSafe Feature, refer to "Enabling Tape Drives for VolSafe" on page 10, for detailed instructions on how to initiate a request to Sun StorageTek to enable VolSafe on tape drives.

VolSafe is always enabled on T10000 tape drives. No menu item is available to enable or disable T10000.

What is VolSafe?

VolSafe is an extension of the Write Protect function of Sun StorageTek 9x40 tape drives. VolSafe cartridges can be used to append a multitude of data sets onto the cartridge until the cartridge is full. The data cannot be overwritten or erased. In this respect, VolSafe enables permanent archival of data on tape without the possibility of data loss, alteration, or overwriting.

VolSafe Secure Media Technology is comprised of microcode in the drive and special tape cartridges. This combination ensures the WORM (Write Once Read Many) capability of the tape cartridges.

9840 VolSafe media is used for the T9840A/B tape drives, and for the T9840C tape drives there is a separate media type, 9840C VolSafe tape cartridges. The T9940B requires the 9940 VolSafe tape cartridges.

Does a Tape Drive Need Modification?

There are no hardware modifications required to use a standard 9840/9940B/T10000 tape drive with VolSafe cartridges. When the VolSafe feature is enabled on the tape drive through the microcode, the tape drive automatically recognizes VolSafe cartridges. The drive microcode enables reading and writing on VolSafe cartridges.

What is VolSafe Used For?

VolSafe is a write mode that allows you to write data onto a cartridge while protecting, at the same time, the data previously written on the cartridge. VolSafe does not allow existing data to be overwritten or erased. The appending of additional data to the cartridge is done immediately following the existing data area on the cartridge (EOD indicator). Any Tape Marks following the data is overwritten and End of File (EOF) marks and End of Data (EOD) is overwritten.

What is a VolSafe Cartridge?

VolSafe media includes unique cartridges that can be purchased and used with automated libraries and by 9x40/T10000 tape drives. VolSafe cartridges can also be used in manual tape operations.

VolSafe cartridges have special physical indications to make them easily recognizable by operators. Refer to the callouts for Figure 1 on page 4, Figure 2 on page 6, and Figure 3 on page 7 to see descriptions of the cartridges.

For more detail about 9x40 cartridges, see the *T9x40 Tape Drive Service Reference Manual*; for information about T10000 cartridges, see the *T10000 Tape Drive Service Manual*.

9840 VolSafe Cartridge

Figure 1 represents a both 9840 or 9840C VolSafe cartridge.

Note: In this example, the first position on the Media ID, machine sensor area (callout 8 below), is recessed, indicating a T9840A/B cartridge. If this were a T9840C cartridge, the second and fourth positions would be recessed.

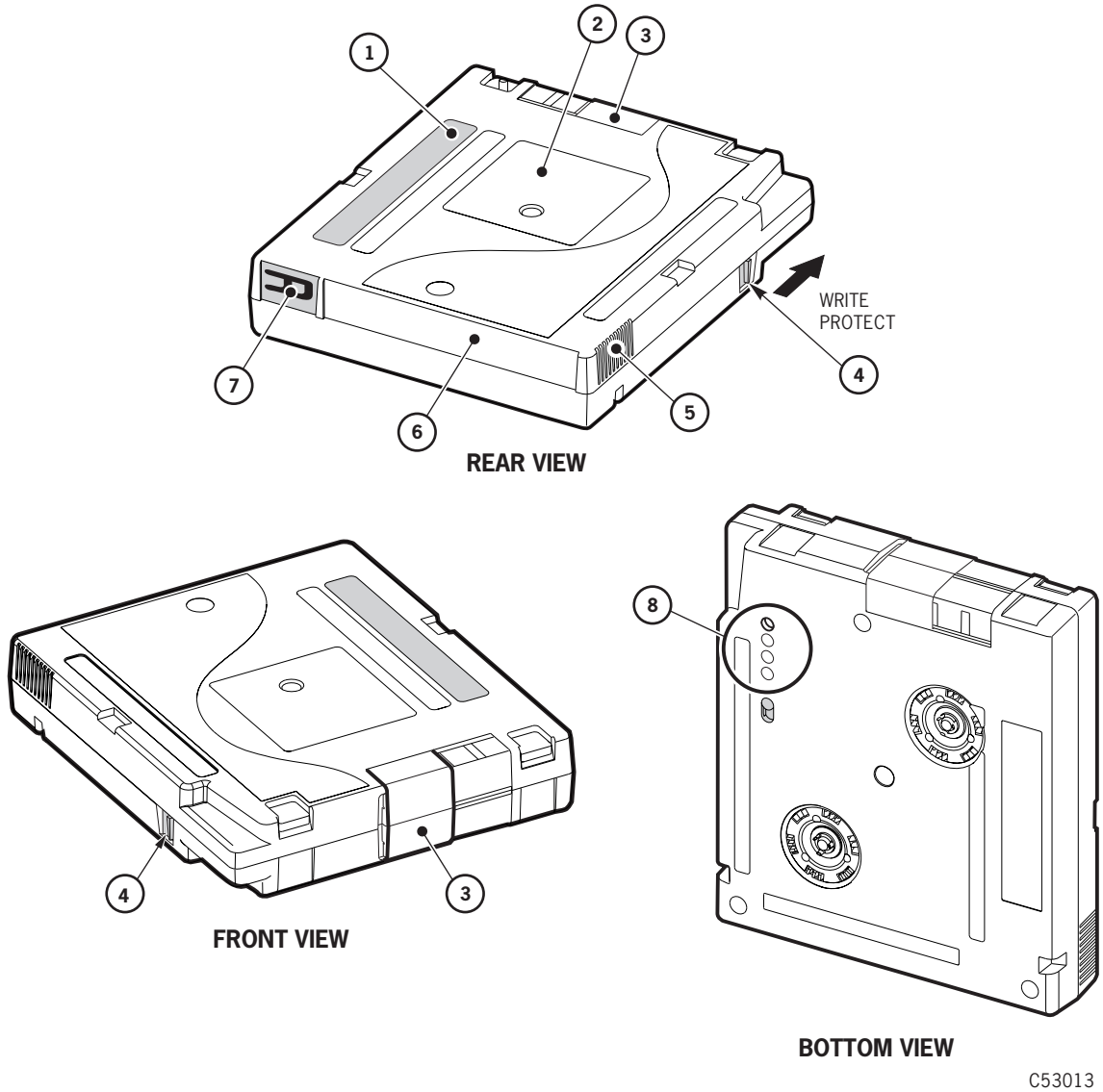

Figure 1. VolSafe 9840 Cartridge

Table 1 provides descriptions of each figure callout.

Table 1. Callout Descriptions - VolSafe 9840/9840C Cartridge

Callout	Description
1	Manufacturer Label Area - background color: • yellow = T9840A/B • green = T9840C
2	Customer Label Area
3	Access Door
4	Write-protect Switch • black = standard data • yellow = T9840A/B • green = T9840C • white = cleaning cartridge
5	Finger Grip
6	VOLSER Label Area
7	Media ID (human and barcode identifiable) - background color: • yellow = T9840A/B • green = T9840C • R = data cartridge • U = cleaning cartridge
8	Media ID (machine sensor area) • all flush = standard data • first position recessed = T9840A/B • second and fourth positions recessed = T9840C • first three positions recessed = cleaning cartridge

9940 VolSafe Cartridge

Figure 2 depicts both a T9940A or T9940B VolSafe cartridge.

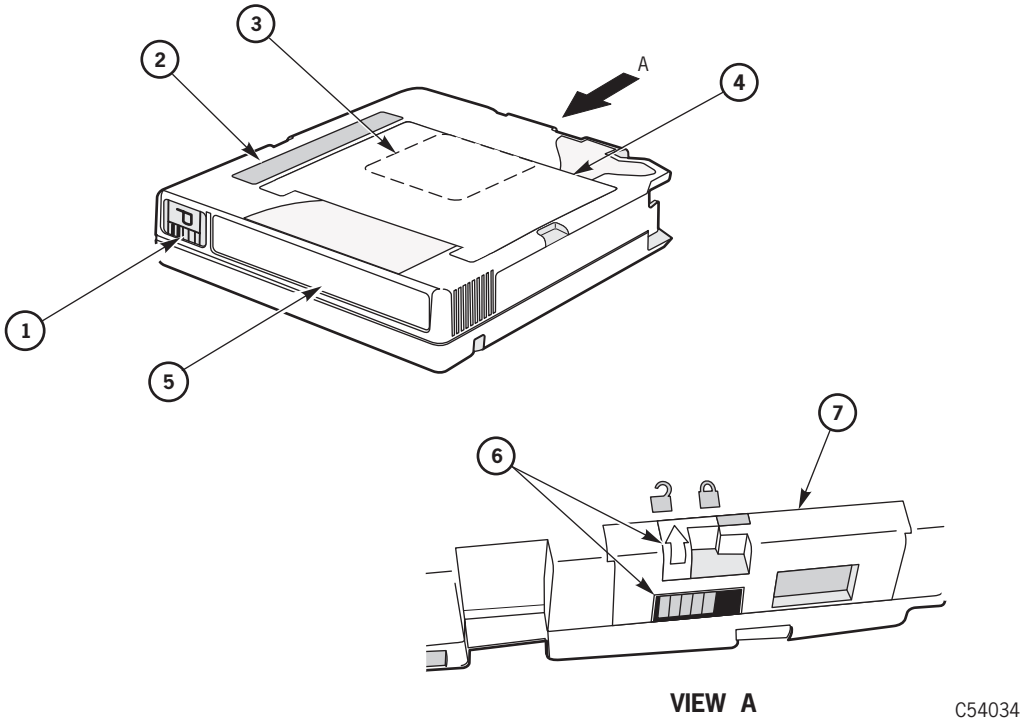

Figure 2. VolSafe 9940 Cartridge

Table 2 provides descriptions of each figure callout.

Table 2. Callout Descriptions - VolSafe 9840 Cartridge

Callout	Description
1	Media ID (human and barcode identifiable) - background color: • yellow = T9940A/B • P = data cartridge • W = cleaning cartridge
2	Manufacturer Label Area, yellow background color
3	Customer Label Area
4	Enlarged Customer Label Area (Geophysical cartridge)
5	VOLSER Label Area
6	Write-protect Switch
7	Media ID (machine sensor area) • yellow = T9940A/B • white = cleaning cartridge

T10000 VolSafe Cartridge

Figure 3 shows a T10000 VolSafe cartridge.

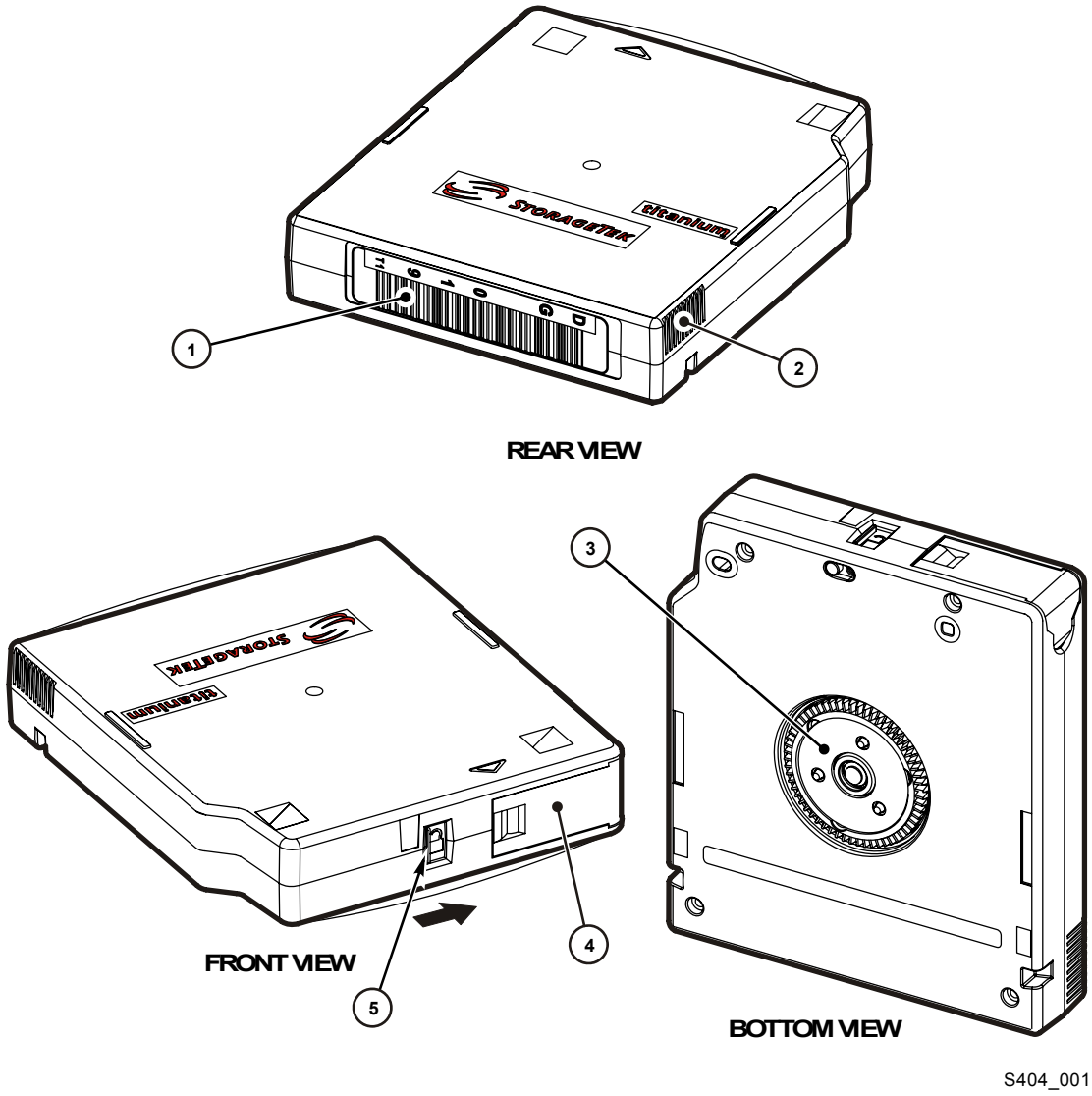

Figure 3. VolSafe T10000 Cartridge

Table 3 provides descriptions of each figure callout.

Table 3. Callout Descriptions - VolSafe T10000 Cartridge

Callout	Description
1	VOLSER Label Area
2	Finger grip
3	Hub

Table 3. Callout Descriptions - VolSafe T10000 Cartridge

Callout	Description
4	Tape Access Door • black = standard data • yellow = standard VolSafe data • red = Sport and Sport VolSafe data • white = cleaning
5	Write-protect Switch

How Does VolSafe Work?

The tape drive at the proper microcode level recognizes VolSafe cartridges from either a physical sensor (the indentation on the 9x40 cartridge) or the RFID (Radio Frequency Identification) chip on a T10000 cartridge, and by electronically examining the media information region (MIR) for a VolSafe bit.

When both conditions are met, the microcode allows blocks to be written to previously unwritten parts of the tape. If even one condition is *not* met, the drive issues a file protect error when a write command is received.

VolSafe Cartridges in a Non-VolSafe Enabled Drive

If a VolSafe cartridge is installed in a non-VolSafe enabled tape drive, the drive supports only the read functions. Attempting to write to a VolSafe cartridge on a non-VolSafe enabled drive results in the drive issuing a file protect status message.

Note: This section is not applicable to T10000.

Enabled VolSafe Tape Drives at a Site

If a library site has VolSafe drives, all of the drives of the same device type must be VolSafe enabled. This practice ensures maximum use of all installed drives and proper control of VolSafe tape cartridges and standard cartridges.

Standard Cartridges in VolSafe Enabled Tape Drives

Standard tape cartridges function normally in all VolSafe-enabled tape drives.

VOLID on VolSafe Cartridges

VOLIDs are written on VolSafe cartridges at the factory, but a scratch tape can be initialized as many times as a user wants. Once data (even one byte) is written to the tape, the tape can not be initialized.

Tape Management Systems Supported

VolSafe cartridges can be used with the HSC and function with any of the following tape management systems, provided the requirements and procedures specified in this document are followed:

- CA-1 tape management system from Computer Associates
- IBM DFSMSrmm tape management system (RMM)
- Control-T tape management system from BMC Software.

Refer to applicable vendor documentation about cartridge volume identification numbers, tape subpool, and volume range information.

Application Storage Manager System

The combination of VolSafe and the Application Storage Manager (ASM) system provides a centralized archive that can contain traditional mainframe/centralized data archive as well as a mechanism to standardize storage solutions at a departmental level. Refer to Chapter 2, “Interfacing VolSafe with a User Application,” for more details.

Enabling Tape Drives for VolSafe

Prerequisites Before Using VolSafe

Note: Before attempting to use VolSafe cartridges, it is important to perform the following prerequisite steps:

1. Complete the Site Survey contained in Appendix A of this guide. Mail the survey form to Sun StorageTek.
2. Contact your local Customer Service Engineer (CSE) to arrange for enabling your tape drives for VolSafe.

Note: This step is not necessary for T10000.

Your Sun StorageTek CSE will enable every tape drive at your site to function with VolSafe. The VolSafe feature is password protected and can only be enabled by a CSE.

Microcode Level Requirement

VolSafe microcode is implemented in all T9840A/B drives with code releases from R1.28.106 and higher, however, we encourage all customers to upgrade to the latest level of code, R1.32.110 for T9840A, and R1.32.310 for T9840B. All T9840C code releases support VolSafe.

All code releases of R1.32.427 or later support VolSafe on the T9940B tape drive (released August 1, 2002). Firmware upgrades are available from Technical Support.

T10000 supports VolSafe at code level R1.31.103.

Chapter 2. Interfacing VolSafe with a User Application

Introduction

The VolSafe feature for Sun StorageTek tape drives was developed as a result of a Sun StorageTek Customer Advisory Board (CAB) of brokerage houses that are subject to Securities and Exchange Commission (SEC) regulations. VolSafe provides a "non-erasable, non-rewritable" extension to the standard use of a tape drive. Data is allowed to be written after the End of Data (EOD) indicator. The EOD is after the volume serial label on a scratch tape and after the last successfully written block on a previously used tape.

Integration of VolSafe with Applications

In normal day-to-day processing, VolSafe media are processed in the same manner as standard media. Special problems with VolSafe are rare.

Two potential problems can arise with applications that do not have native VolSafe support:

- If an I/O error occurs, a common recovery approach is to issue a backspace command to the tape drive and attempt to rewrite the block. VolSafe, as intended, prevents this.

  The tape volume may be marked as bad or unusable. The data on the tape is still protected and readable, but the remainder of the tape is wasted. This does not in any way violate the WORM capability of the tape but can cause customer satisfaction issues if the media is not fully utilized.

- Another problem arises with tape subpool allocation. If an entry person makes a mistake assigning VOLSERs to be used in the WORM tape pool, that is, if the designation of the WORM pool does not agree with the physical location of the VolSafe media in the library, the application may write to a non-VolSafe tape. Products that provide native support, such as ASM products, ensure that any scratch tapes mounted for VolSafe-designated archive pools are VolSafe cartridges.

With non-natively supported applications, in the event that problems were to occur (i.e., cancelled jobs, I/O errors, power outages, or other similar activities), it is suggested that users have a formal response to the items listed in Table 4.

Table 4. Potential Concerns for Applications with Suggested Responses

Problem	Suggested Solution
Incorrect media mounted	Check to ensure that VolSafe media is mounted when it is required and that standard media is mounted when it is required.
Abnormal job termination	Invoke tape error recovery that positions tape after the previously written area of the media
Network security (UNIX only)	Non-IBM systems, ensure that data targeted for VolSafe is protected while in transit through a network, such as a network file system (NFS) mounted disk.

For each operating system, Sun StorageTek provides the media information for applications through these standard system techniques.

- For ESCON users, the media information can be retrieved from the Sun StorageTek SubSystem Interface (SSI). There are system requirements and the Application Program Interface (API) must be written in Assembler language. Example code and details can be found in Appendix B.
- SCSI users must code a program to examine the sense information returned from the drive. Example pseudo code can be found in Appendix C.

The examples have no warranty from Sun StorageTek. The user assumes all the risk.

Error recovery could occur in the following ranges:

- from - implementing manual procedures, such as changing the job run script (JCL) to bypass the partial/error file and start a new file.
- to - implementing a sophisticated routine that includes logic and data knowledge to position a data block passed a previously written block. The routine could use COMIT logic, as used in data base methodology, to gain the knowledge of the last good block.

UNIX systems would require analysis to discover the best way to integrate the VolSafe security in the system.

Integrate or Use Storage Management?

Customers have the choice of modifying their application or using a storage management portal, such as the Application Storage Manager, to manage the data intended for VolSafe. Time, integration, expertise, resources, ease of implementation, cost comparison and reliability are some of the factors to be considered before making the best decision.

Application Storage Manager from Sun StorageTek

Application Storage Manager™ (ASM) for S/390, ASM for OAM/DB2, ASM for UNIX, and ASM for Windows are storage management products designed to insulate an application from the responsibilities associated with managing data and associated storage that the application creates and utilizes.

The ASM products are “policy-based” software that allow the user to define storage hierarchy, data retention periods, and retrieval processing based on corporate business requirements. These data/storage policies can be associated to an application or a group of applications. ASM operates in collaboration with the application as it manages the data and associated storage.

As Sun StorageTek expands the tape product line, ASM users are secure in the knowledge that systems with a “non-erasable, non-rewritable” business requirement will continue to have VolSafe data protection at the highest level. ASM allows a customer or vendor to focus on business application development without adding additional time and cost for VolSafe integration with the application.

Additional information on ASM can be found in the publications listed in “ASM Publications” on page ix for the applicable ASM operating environments.

Chapter 3. Using VolSafe with the Host Software Component (HSC)

Overview of VolSafe Cartridge Considerations

VolSafe cartridges can be efficiently used with the HSC; however, there are certain important considerations that must be followed. These considerations include:

- Enabling tape drives for VolSafe (Refer to "Enabling Tape Drives for VolSafe" on page 10)
- Assigning volume serial numbers for VolSafe cartridges in HSC scratch subpools
- Defining esoteric names for VolSafe cartridges in HSC
- Tape management systems.

Assigning Volume Serial Numbers (VSN) for VolSafe Cartridges in HSC Scratch Subpools

A scratch tape subpool is a defined set of scratch tapes. Scratch subpools are composed of one or more ranges of VOLSERs with similar physical characteristics, including the type of volume. For VolSafe, the volumes must be VolSafe cartridges.

The purpose of subpooling is to ensure that certain data sets are written only within a particular range of volumes. If a volume which does not belong to the required subpool is mounted for a particular data set, it is dismounted and the mount reissued.

VolSafe cartridges intended to be used in HSC scratch subpools must have their Volume Serial Numbers (VSNs) identified to match the scratch subpool defined in the tape management system (TMS) for the library installation. The identification of the VSNs must be a one on one match.

Typical tape management systems that can be used with VolSafe are CA-1, CA/DYNAM/TMS or DFSMSrmm.

Refer to the *Host Software Component (HSC) System Programmer's Guide* for detailed information about volume serial numbers and HSC scratch subpools.

Defining HSC Scratch Subpools

When implementing the VolSafe feature using the HSC, refer to the *Host Software Component System Programmer's Guide* for detailed information about the Scratch Conversion Utility (SLUCONDB). The SLUCONDB program generates scratch transactions from the tape management system.

Defining Esoteric Names for VolSafe Cartridges in HSC

Esoteric names, used in JCL to point to a group of tape devices must be unique for each media type (Standard and VolSafe). Each esoteric points to all VolSafe drives in the site. The drive loads the tape and decides what to do based on the VolSafe criteria discussed in "How Does VolSafe Work?" on page 9. The esoteric names must point to separate HSC tape subpools; that is, VolSafe tapes in one pool and standard tapes in the other.

Refer to the *Host Software Component (HSC) System Programmer's Guide* for detailed information about esoteric name requirements and device referencing.

Figure 4 illustrates an example of JCL showing how to use an esoteric name for a VolSafe

```
//jobname  JOB EXMPL
//UNLOAD   EXEC PGM=IEBGENER
//SYSPRINT DD SYSOUT=*
//INDD     DD UNIT=CART,VOL=SER=0S4000,LABEL=(2,SL)
//OUTDD    DD DSN=your.volsafe.archive,DISP=(,CATLG),
//             UNIT=VSAFE, LABEL=(,SL),
//             DCB=(RECFM=FB,LRECL=80,BLKSIZE=3120)
//SYSIN    DD *
 C I=INDD,O=OUTDD
/*
//
```

Figure 4. Example JCL for Writing to a VolSafe Cartridge

cartridge. The JCL writes from an input tape volume to a VolSafe cartridge identified by a VolSafe esoteric name called **VSAFE**.

Chapter 4. Using VolSafe with Automated Cartridge System Library Software (ACSLS)

Overview of VolSafe Cartridge Considerations

VolSafe cartridges can be efficiently used with ACSLS; however, there are certain important considerations that must be followed.

These considerations include:

- Enabling Tape Drives for VolSafe (Refer to “Enabling Tape Drives for VolSafe” on page 10)
- Adding VolSafe cartridges to your ACSLS controlled library
- Defining VolSafe cartridges and assigning them to a scratch pool
- Requesting scratch mounts from a VolSafe scratch pool.

Adding VolSafe Cartridges to an ACSLS-Controlled Library

To add VolSafe cartridges to an ACSLS-controlled library having VolSafe-enabled tape drives, perform the following steps:

1. Use the ACSLS “define pool” command to create a new scratch pool to contain on the VolSafe volumes.
2. Enter the VolSafe cartridges into the library following procedures described in the “Entering Cartridges” procedures described in the Automated Cartridge System Library Software System Administrator Guide.

After VolSafe cartridges are entered into the library, define the cartridges and assign them to a scratch pool as described below.

Defining VolSafe Cartridges and Assigning Them to a Scratch Pool

Use the ACSLS “set scratch” command to define the VolSafe cartridges as scratch volumes and to assign them to the scratch pool defined in Step 1 above.

Requesting Scratch Mounts from a VolSafe Scratch Pool

MVS/CSC Clients

Before requesting VolSafe cartridges as scratch mounts, ensure:

1. That the Tape Management System (TMS) scratch pools identically match the ACSLS scratch pool(s) defined. Refer to “Adding VolSafe Cartridges to an ACSLS-Controlled Library” on page 17.
2. That esoteric(s) that reference VolSafe-enabled transports are unique for the VolSafe media type and that they point to ACSLS-defined scratch pools.
3. That job allocation restricts mounts of VolSafe cartridges to VolSafe-enabled tape drives (this should be easy as all drives are required to have VolSafe microcode).

Clients Other Than MVS/CSC

When requesting scratch mounts of VolSafe cartridges, the client must request tape transports with VolSafe media and must request volumes from the scratch pool previously defined.

Appendix A. Sample Code to Determine the Type of Media in a 9x40 or T10000 Drive (ESCON)

Most applications are not written in assembler so they will not be able to access the Sun StorageTek SSI to determine what type of media is mounted. The application would need to call this routine before every open and would need to pass the DDNAME of the VolSafe file. The VolSafe subroutine would return the type of media mounted. The sample code below is not a complete assembler program ready to assemble a module. There is no warranty implied and this is only an example to assist in creating a proper calling module. The notes and requirements are:

1. A parameter area with at least two fields:
   - The DDNAME of the tape drive to be examined (file must be closed when this module is called)
   - A field to return type of media (VolSafe, Standard)
2. The OPEN must be TYPE=EXCP
3. The assembled module must be in an authorized library to be called for the media information.

```
                    Standard Assembler Housekeeping
          .
          .         Find DDNAME and OPEN for EXCP
          .
PSF#1     EQU   *
          MODESET KEY=ZERO
          L     R1,DEVICE+44            LOCATE DEB FROM DCB
          USING DEBBASIC,R1
          ICM   R2,7,DEBAPPB            LOCATE DEB PREFIX AREA
          DROP  R1
          USING DEBAVT,R2
          LA    R3,SIOXIT               PICKUP ADDRESS OF SIO APPENDAGE
          STCM  R3,7,DEBSIOAD              AND STORE INTO DEB
          DROP  R2
          MODESET KEY=NZERO
          .
          .
          .
```

```
         LA    R1,CCWPSF#1             SET CAW
         BAL   R10,EXCPSUB             ISSUE EXCP + WAIT
         CLI   ECB,X'7F'               EVERYTHING OK?
         BE    PSF#2                   YES
         .
         .
         .
PSF#2    LA    R1,CCWPSF#2             SET CAW
         BAL   R10,EXCPSUB             ISSUE EXCP + WAIT
         CLI   ECB,X'7F'               EVERYTHING OK?
         BE    RDSSD                   YES
         .
         .     error routine
         .
RDSSD    TM    EXCPBFR+15,X'80'        VOLSAFE CAPABLE?
         BZ    NOTSAFE                 NO
         TM    EXCPBFR+14,X'80'        VOLSAFE CARTRIDGE MOUNTED?
         BZ    NOTSAFE                 NO
         .
         .
         .
EXCPSUB  ST    R1,CAW                  STORE CCW ADDRESS
         XC    EXCPBFR,EXCPBFR         RESET DATA BUFFER
         XC    ECB,ECB                 RESET ECB
         EXCP  IOB                     INITIATE I/O
         WAIT  ECB=ECB                 WAIT FOR COMPLETION
         BR    R10                     RETURN TO CALLER
         .
         .
         .
SIOXIT   STM   R0,R15,0(R13)
         USING RQE,R1                  ON ENTRY R1 POINTS TO RQE
         L     R10,RQESRB              LOCATE SRB
         USING SRBSECT,R10
         L     R11,SRBPARM             LOCATE IOSB
         USING IOSB,R11
         OI    IOSOPT,IOSBYP           BYPASS PREFIXING
         OI    IOSPKEY,IOSCHCMP        BYPASS CHANNEL SCAN
         LM    R0,R15,0(R13)
         BR    R14
         DROP  R1,R10,R11
         .
         .
         .
```

```
DEVICE   DCB   DDNAME=DEVICE,MACRF=(E),DSORG=PS,IOBAD=IOB,RECFM=F
ECB      DC    F'0'
IOB      DC    X'42',AL3(0)            X'42' FOR COMMAND CHAINING
         DC    A(ECB)                  ECB ADDRESS
CSW      DC    2A(0)                   S/370 FORMAT CSW
CAW      DC    A(0)                    CCW ADDRESS
         DC    A(DEVICE)               DCB ADDRESS
         DC    A(0)                    RESERVED
         DC    H'1',H'0'               BLOCK COUNT INCREMENT
MBBCCHHR DC    A(0),A(1)               DASD EXTENSION (MBBCCHHR)
         .
         .
         .
CCWPSF#1 CCW   X'77',ORDER#1,X'20',20  PSF IDENTIFY HOST
CCWPSF#2 CCW   X'77',ORDER#2,X'60',12  PSF PREPARE FOR READ SUBSYS DATA
CCWRDSSD CCW   X'3E',EXCPBFR,X'20',44  READ SUBSYSTEM DATA
ORDER#1  DC    XL3'400008',XL17'00'    ORDER FOR IDENTIFY GENERIC HOST
ORDER#2  DC    XL12'180000000000030000000000' ORDER FOR PREPARE FOR RSD
EXCPBFR  DC    XL160'00'
         .
         .
         .
         IECDIOSB
         IECDRQE
         IEZDEB
         IHASRB
         .
         .
         .
         END
```

Appendix B. Sample Code to Determine the Type of Media in a 9x40 or T10000 Drive (SCSI)

The SCSI sense information for the drive contains the VolSafe sense information. This is sample pseudo code to detect the type of media in a SCSI-attached tape drive. The customer needs to write the actual code based on the customer's UNIX system and insert it into a server program to be called by client programs to determine the type of media mounted in the drive. Each UNIX system has unique requirements and this code does not run as is it is written.

Assumptions: A program that detects changes by constantly looping commands across the interface. This assumes tape is not loaded.

```
        while( ! UNIT_ATTENTION)
                loop (for_number_of_possible_drives)
                        test_unit_ready()
                                if( ! AUTO_SENSE)
                                        request_sense( 26_bytes)
        end while
// A tape should be loaded and the sense data obtained
        if ( REQUEST_SENSE_DATA_BYTE_24 == 0x02 )
                TAPE_LOADED = VOL_SAFE_TAPE
        else
                TAPE_LOADED = REGULAR_TAPE

//The above could be modified for a system which does not loop until it knows that a volume has been
mounted.

// Error recovery sample

        mark_tape = PARTIAL
        rewind ( tape )
        write_file_on_different_tape()
```

```
        while( ! UNIT_ATTENTION)
                loop (for_number_of_possible_drives)
                        test_unit_ready()
                                if( ! AUTO_SENSE)
                                        request_sense( 26_bytes)
        end while
// A tape should be loaded and the sense data obtained
        if ( REQUEST_SENSE_DATA_BYTE_24 == 0x02 )
                TAPE_LOADED = VOL_SAFE_TAPE
        else
                TAPE_LOADED = REGULAR_TAPE
```

//The above could be modified for a system which does not loop until it knows that a volume has been mounted.

// Error recovery sample

```
        mark_tape = PARTIAL
        rewind ( tape )
        write_file_on_different_tape()
```

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