OS/390

IBM

DFSMS Object Access Method Planning, Installation, and Storage Administration Guide for Tape Libraries

Release 10

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> **Note!**
>
> Before using this information and the product it supports, be sure to read the general information under "Notices" on page 285.

Contents

Figures

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Preface

The Object Access Method (OAM) is a component of DFSMSdfp, the base for the Storage Management Subsystem (SMS) of DFSMS. OAM plays a central role in the software support of the automated and manual tape library dataservers.

SMS provides management facilities for tape volumes and tape libraries to streamline and incorporate tape storage facilities into the OS/390 system-managed environment. This book discusses the management of the tape libraries and their associated tape volumes, not the data that reside on the volumes. For more information on OAM's role in object storage on tape, optical volumes, and DASD, refer to *OS/390 DFSMS OAM Planning, Installation, and Storage Administration Guide for Object Support*.

About This Book

This book introduces OAM and its role in the support of tape libraries and explains how to do the following tasks:
- Plan and install OAM for use with the tape library
- Define your tape configuration
- Operate the OAM address space
- Invoke LCS External Services to perform various tape library functions
- Customize the installation exits

This book is for system programmers, storage administrators, and system operators who perform these tasks.

Required Product Knowledge

To understand OAM and tape libraries, you should be familiar with:
- DFSMSdfp
- Integrated catalog facility (ICF)
- Interactive Storage Management Facility (ISMF)
- Hardware configuration definition (HCD)

Organization

This book contains the following:
- **"Chapter 1. Introduction to Tape Library Management" on page 1** provides an overview of the fundamental concepts of OAM as it relates to tape libraries.
- **"Chapter 2. Planning for the Tape Library Support" on page 31** is a discussion of topics to consider when you are planning for the installation and implementation of SMS-managed tape.
- **"Chapter 3. Installing Your Tape Library Support" on page 45** explains how to install and customize tape library support. An installation checklist and step-by-step details are provided to aid in the process.
- **"Chapter 4. Defining and Monitoring Your Configuration" on page 61** provides information on defining your tape configuration.
- **"Chapter 5. Operating the OAM Address Space" on page 69** describes operator commands that are used to operate the OAM address space.
- **"Chapter 6. LCS External Services" on page 107** describes the LCS external services and their interaction with the installation exits in the performance of various tape library functions.

- "Chapter 7. Installation Exits" on page 149 contains information on installation exits.
- "Appendix A. SAMPLIB Members" on page 185 lists the members of the sample library (SAMPLIB) which pertain to tape library processing.
- "Appendix B. ISMF Panels to Define and Monitor Your Configuration" on page 245 contains ISMF information and examples of how to define and monitor the SMS configuration using ISMF panels and line operator commands.
- "Glossary" on page 289 defines certain terms as they pertain to SMS-managed tape.
- "Index" on page 295 gives the location for specific words and terms used in this book.

Related Publications

The following publications may be helpful and may be referenced within this document. Please note that the minimum levels of the publications are listed for use in conjunction with materials in this edition. You may also use any subsequent levels of these publications.

Short Title	Publication Title	Order Number
OS/390 DFSMS Access Method Services for Catalogs	OS/390 DFSMS Access Method Services for Catalogs	SC26-7326
OS/390 DFSMSdfp Diagnosis Guide	OS/390 DFSMSdfp Diagnosis Guide	SY27-7610
OS/390 DFSMSdfp Storage Administration Reference	OS/390 DFSMSdfp Storage Administration Reference	SC26-7331
OS/390 DFSMSdfp Diagnosis Reference	OS/390 DFSMSdfp Diagnosis Reference	SY27-7611
OS/390 DFSMSdss Diagnosis Guide	OS/390 DFSMSdss Diagnosis Guide	LY35-0113
OS/390 DFSMSdss Storage Administration Guide	OS/390 DFSMSdss Storage Administration Guide	SC35-0393
OS/390 DFSMSdss Storage Administration Reference	OS/390 DFSMSdss Storage Administration Reference	SC35-0394
OS/390 DFSMShsm Diagnosis Guide	OS/390 DFSMShsm Diagnosis Guide	LY35-0111
OS/390 DFSMShsm Implementation and Customization Guide	OS/390 DFSMShsm Implementation and Customization Guide	GC35-0385
OS/390 DFSMShsm Storage Administration Guide	OS/390 DFSMShsm Storage Administration Guide	SC35-0388
OS/390 DFSMShsm Storage Administration Reference	OS/390 DFSMShsm Storage Administration Reference	SC35-0389
OS/390 DFSMShsm Diagnosis Reference	OS/390 DFSMShsm Diagnosis Reference	LY35-0112
OS/390 DFSMSrmm Diagnosis Guide	OS/390 DFSMSrmm Diagnosis Guide	SY26-7612
OS/390 DFSMSrmm Implementation and Customization Guide	OS/390 DFSMSrmm Implementation and Customization Guide	SC26-7334

Short Title	Publication Title	Order Number
OS/390 DFSMSrmm Guide and Reference	*OS/390 DFSMSrmm Guide and Reference*	SC26-7333
OS/390 DFSMS Introduction	*OS/390 DFSMS Introduction*	SC26-7344
OS/390 DFSMS Installation Exits	*OS/390 DFSMS Installation Exits*	SY27-7613
OS/390 DFSMS: Managing Catalogs	*OS/390 DFSMS: Managing Catalogs*	SC26-7338
OS/390 DFSMS OAM Application Programmer's Reference	*OS/390 DFSMS Object Access Method Application Programmer's Reference*	SC35-0390
OS/390 DFSMS OAM Planning, Installation, and Storage Administration Guide for Object Support	*OS/390 DFSMS Object Access Method Planning, Installation, and Storage Administration Guide for Object Support*	SC35-0391
OS/390 DFSMS Migration	*OS/390 DFSMS Migration*	SC26-7329
DFSMS/MVS Program Directory	*DFSMS/MVS Program Directory*	**Note:** Included in the product shipment. It cannot be ordered separately.
OS/390 DFSMS: Using the Interactive Storage Management Facility	*OS/390 DFSMS: Using the Interactive Storage Management Facility*	SC26-7340
3490 Introduction	*IBM 3490 Magnetic Tape Subsystem Enhanced Capability Models C10, C11, and C22 Introduction*	GA32-0217
3490 Planning and Migration Guide	*IBM 3490 Magnetic Tape Subsystem Enhanced Capability Models C10, C11, and C22 Planning and Migration Guide*	GC35-0219
3490 Operator's Guide	*IBM 3490 Magnetic Tape Subsystem Enhanced Capability Models C10, C11, and C22 Operator's Guide*	GA32-0218
3494 Tape Library Dataserver Introduction and Planning Guide	*IBM 3494 Tape Library Dataserver Introduction and Planning Guide*	GA32-0279
MAGSTAR 3494 Tape Library Operator's Guide	*IBM Magstar 3494 Tape Library Operator's Guide*	GA32-0280
3495 Tape Library Dataserver Installation Planning and Migration Guide	*IBM 3495 Tape Library Dataserver Installation Planning and Migration Guide*	GC35-0135
3495 Tape Library Dataserver Introduction	*IBM 3495 Tape Library Dataserver Introduction*	GA32-0234
3495 Tape Library Dataserver Operator's Guide	*IBM 3495 Tape Library Dataserver Operator's Guide*	GA32-0235
3590 Introduction and Planning Guide	*Magstar 3590 Tape Subsystem Introduction and Planning Guide*	GA32-0329

Short Title	Publication Title	Order Number
3590 User's Guide	*Magstar 3590 Tape Subsystem User's Guide*	GA32-0330
3590 Hardware Reference	*Magstar 3590 Tape Subsystem Hardware Reference*	GA32-0331
Magstar 3590 Tape Subsystem 3590 Technical Guide	*Magstar 3590 Tape Subsystem Technical Guide*	GG24-2506
OS/390 MVS Initialization and Tuning Guide	*OS/390 MVS Initialization and Tuning Guide*	SC28-1751
OS/390 MVS IPCS Commands	*OS/390 MVS Interactive Problem Control System (IPCS) Commands*	GC28-1754
OS/390 MVS JCL Reference	*OS/390 MVS JCL Reference*	GC28-1757
OS/390 HCD Planning	*OS/390 Hardware Configuration Definition Planning*	GC28-1750
OS/390 DFSMS: Implementing System-Managed Storage	*OS/390 DFSMS: Implementing System-Managed Storage*	SC26-7336
MVS/ESA SML: Leading a Storage Administration Group	*MVS/ESA Storage Management Library: Leading a Storage Administration Group*	SC26-3126
MVS/ESA SML: Managing Data	*MVS/ESA Storage Management Library: Managing Data*	SC26-3124
MVS/ESA SML: Managing Storage Groups	*MVS/ESA Storage Management Library: Managing Storage Groups*	SC26-3125
OS/390 HCD User's Guide	*OS/390 HCD User's Guide*	SC28-1848
OS/390 MVS Planning: Global Resource Serialization	*OS/390 MVS Planning: Global Resource Serialization*	GC28-1759
OS/390 SecureWay Security Server RACF Command Language Reference	*OS/390 SecureWay Security Server RACF Command Language Reference*	SC28-1919
OS/390 MVS System Commands	*OS/390 MVS System Commands*	GC28-1781
OS/390 MVS System Messages, Vol 1 (ABA-ASA)	*OS/390 MVS System Messages, Volume 1 (ABA-ASA)*	GC28-1784
OS/390 MVS System Messages, Vol 2 (ASB-EZM)	*OS/390 MVS System Messages, Volume 2 (ASB-EZM)*	GC28-1785
OS/390 MVS System Messages, Vol 3 (GDE-IEB)	*OS/390 MVS System Messages, Volume 3 (GDE-IEB)*	GC28-1786
OS/390 MVS Data Areas, Vol 4 (RD-SRRA)	*OS/390 MVS Data Areas, Volume 4 (RD-SRRA)*	SY28-1167

Short Title	Publication Title	Order Number
OS/390 MVS System Messages, Vol 5 (IGD-IZP)	*OS/390 MVS System Messages, Volume 5 (IGD-IZP)*	GC28-1788
OS/390 MVS Using the Subsystem Interface	*OS/390 MVS Using the Subsystem Interface*	SC28-1789
VM/ESA Planning and Administration Guide	*VM/ESA R2.0 Planning and Administration Guide*	SC24-5521
VM/ESA Running Guest Operating Systems	*VM/ESA R2.0 Running Guest Operating Systems*	SC24-5522

Accessing OS/390 DFSMS Books on the Internet

In addition to making softcopy books available on CD-ROM, IBM provides access to unlicensed OS/390 softcopy books on the Internet. To find OS/390 books on the Internet, first go to the OS/390 home page: **http://www.ibm.com/s390/os390/** From this Web site, you can link directly to the OS/390 softcopy books by selecting the Library icon. You can also link to IBM Direct to order hardcopy books.

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Summary of Changes

The summary of changes informs you of changes to this book. Revision bars (|) in the left margin of the book indicate changes from the previous edition.

Summary of Changes for SC35-0392-00 OS/390 DFSMSoam Version 2 Release 10

This book contains information previously presented in *DFSMS/MVS Version 1 Release 5 Object Access Method Planning, Installation, and Storage Administration Guide for Tape Libraries*, SC26-3051-07.

- AUDIT functions previously provided as ISMF line operators are provided as MVS operator commands.
- Additional eject recommendations.
- TDSI Toleration Considerations.

Summary of Changes for SC26–3051–07 DFSMS/MVS Version 1 Release 5

This book contains information previously presented in *DFSMS/MVS Version 1 Release 5 Object Access Method Planning, Installation, and Storage Administration Guide for Tape Libraries*, SC26–3051–06.

- The "Duplicate Volume Management" section has been added to explain usage of the storage class name DUPT@SMS to be specified with the storage class parameter on the JCL with DISP=OLD, thus forcing allocation of this request to a stand-alone device. See "Duplicate Volume Management" on page 8 for further details.
- The Virtual Tape Server (VTS) Import/Export cancel sections have been updated to better explain the differences between a host-initiated cancel and a cancel initiated at the library manager. For additional information, see "Canceling an Import Operation" on page 21 and "Canceling an Export Operation" on page 28.
- Eject limitations for the number of eject requests that device services can have queued across all libraries from a single system have been added. This queue limit is currently set at 1600. For this limit to be as transparent as possible, see "Ejecting a Tape Cartridge from a Tape Library Dataserver" on page 26.
- The CBRUXEJC installation exit has been updated with the RC=12 (UXJIGNOR) ignore option to enable another tape management system that owns the exported volume to process the volume. See page 28 for additional information.
- A "TCDB Volume Expiration Date" section has been added. See "TCDB Volume Expiration Date" on page 37 for more information.
- Support for the Peer-to-Peer VTS Subsystem makes it possible to combine two VTS subsystems with the necessary hardware to create a single Peer-to-Peer VTS Subsystem that is seen as one library image to the attached hosts. For more details on the Peer-to-Peer VTS Subsystem, see "Peer-to-Peer Virtual Tape Server Subsystem" on page 16.
- Changes to the DISPLAY SMS,OAM command display. See "Displaying OAM Status" on page 81 for further information.
- Changes to the DISPLAY SMS,LIBRARY command display. See "Displaying Library Detail Status" on page 86 for further information.

Summary of Changes for SC26-3051-06 DFSMS/MVS Version 1 Release 5

This book contains information previously presented in *DFSMS/MVS Version 1 Release 5 Object Access Method Planning, Installation, and Storage Administration Guide for Tape Libraries*, SC26-3051-05.

- The Special Programming Enhancement (SPE), which introduces OAM's support for 256-track recording technology.
- "Tape Subsystems" on page 11 has been updated to reflect support for 3590 Model E devices.
- Table 1 on page 32 has been updated to include 256-track recording technology.
- "Tape Device Selection Information" on page 34 has been updated with 3590 read-compatibility processing information.
- A new section, "3590 Model E Toleration Considerations" on page 46, has been added to explain toleration PTF requirements.
- Display CBR1220I on page 90 has been updated to include 3590-E as one of the available device types.
- Display CBR1180I on page 96 has been updated to include the new error status of TRKCMPAT and 256-track recording technology.
- "Tape Volume Information Assembler Mapping — CBRTVI", Figure 15 on page 143, and "Tape Device Selection Information Assembler Mapping — CBRTDSI", Figure 16 on page 147, have been updated to reflect 256-track recording technology.
- "Change Use Attribute Installation Exit Parameter List — CBRUXCPL", Figure 18 on page 152, and "Volume Not in Library Installation Exit Parameter List — CBRUXNPL", Figure 29 on page 179, have been modified to include 256-track recording technology information.
- "Cartridge Entry Installation Exit (CBRUXENT)" on page 156, "Cartridge Entry Installation Exit Parameter List (CBRUXEPL)" on page 159, and "Cartridge Eject Installation Exit Parameter List (CBRUXJPL)" on page 167 have been updated to reflect 256-track recording technology.

Summary of Changes for SC26-3051-05 DFSMS/MVS Version 1 Release 5

This book contains information previously presented in *DFSMS/MVS Version 1 Release 5 Object Access Method Planning, Installation, and Storage Administration Guide for Tape Libraries*, SC26–3051–04.

- OAM now provides the ability to physically import (enter) and export (remove) logical volumes within a Virtual Tape Server subsystem (VTS). This support includes managing the physical removal of the 3590 cartridges containing stacked logical volumes from a VTS and the corresponding function for entering these cartridges into a VTS. These functions require interaction with the host and the tape management system. For more information, see "Importing Logical Volumes into a VTS Subsystem" on page 19 and "Exporting Logical Volumes from a VTS Subsystem" on page 27.
- A procedure for retrieving data from a disabled ATLDS has been provided. It allows you to allocate your library volumes to stand-alone devices by changing the TCDB information for the volume. This enables you to retrieve your data from the volumes in the disabled automated tape library. See "TCDB Procedure for Retrieving Data from a Disabled IBM Automated Tape Library" on page 65 for details.

- A new LIBRARY,IMPORT command is introduced to initiate or cancel an import operation at the library. See "Importing Tape Volumes into a VTS" on page 77 for the syntax of this command.
- A new LIBRARY,EXPORT command is provided to initiate or cancel an export operation at the library. See "Exporting Tape Volumes from a VTS" on page 77 for the syntax of this command.
- The CBR1100I OAM Status display has been updated to include information on total number of virtual tape servers in the environment. See "Displaying OAM Status" on page 81 for the updated display.
- The CBR1110I OAM Library (All) Detail Status display has been updated to include information on VTS libraries in the environment. See the "DISPLAY SMS,LIBRARY(ALL),DETAIL status display" on page 87 for the updated display.
- Additional library category types and status lines have been added to the CBR1180I OAM Tape Volume Status display to support the import and export functions. See "Displaying Tape Volume Status" on page 94 for the new library category types and status lines.
- The Query Volume Residence (QVR) function has been modified to verify the library residence of a volume that does not have a TCDB volume record. This provides audit capabilities driven from a tape management system database. For more overview information, see "Query Volume Residence (QVR)" on page 108, and for details on QVR, see "Querying the Residence of a Volume" on page 122.
- LCS External Services has been updated for the import and export functions. See "Export Logical Volumes (EXPORT)" on page 108 and "Import Logical Volumes (IMPORT)" on page 108 for an overview of these functions, and "Exporting Logical Volumes from a VTS" on page 127 and "Importing Logical Volumes into a VTS" on page 129 for more details.
- The CBRLCSPL parameter list has been modified to include import and export information. See Figure 14 on page 133 for these changes.
- The Cartridge Entry Installation Exit has been modified to include support for importing logical volumes. For more information, see "Cartridge Entry Installation Exit (CBRUXENT)" on page 156.
- The Cartridge Eject Installation Exit has been modified to include support for exporting logical volumes. See "Cartridge Eject Installation Exit (CBRUXEJC)" on page 164 and "Export Completion Processing" on page 166 for more information.
- The SAMPLIB members CBRSPUXJ and CBRSPUXE have been modified through an APAR to be reentrant. See "SAMPLIB Member CBRSPUXE" on page 204 and "SAMPLIB Member CBRSPUXJ" on page 211.
- Four JCL sample jobs (CBRSPSIM, CBRSPPIM, CBRSPSXP, and CBRSPPXP) are provided to assist in creating the import or export list volume using a scratch volume, or import or export list volume using a private volume. For more information, see "SAMPLIB Member CBRSPSIM" on page 233, "SAMPLIB Member CBRSPPIM" on page 235, "SAMPLIB Member CBRSPSXP" on page 238, and "SAMPLIB Member CBRSPPXP" on page 241.
- The SAMPLIB member CBRSPLCS has been updated to invoke the CBRXLCS programming interface EXPORT and IMPORT functions. See "SAMPLIB Member CBRSPLCS" on page 186 for more information.
- The volume not in library SAMPLIB member, CBRSPUXV, has been updated to recognize when a logical volume with a shelf location of STACKED=*volser* is requested to be mounted. See "SAMPLIB Member CBRSPUXV" on page 219 for more information.

Summary of Changes for SC26-3051-04 DFSMS/MVS Version 1 Release 4

This book contains information previously presented in *DFSMS/MVS Version 1 Release 3 Object Access Method Planning, Installation, and Storage Administration Guide for Tape Libraries*, SC26-3051-03.

- OAM supports the Virtual Tape Server (VTS) subsystem in an ATLDS using virtual tape drives and virtual tape volumes that emulate 3490E tape devices and Cartridge System Tape media, Enhanced Capacity Cartridge System Tape media, or both, to the host system. The VTS supports volume stacking by allowing cartridges to be stacked end-to-end on a cartridge, taking up only the number of bytes written by the host, and effectively utilizing the storage capacity of the 3590 tape technology. For more information concerning the VTS, see "Virtual Tape Server Subsystem of the ATLDS" on page 12, and for more information concerning volume stacking, see the discussion on page 13.

- The Magstar 3590 High Performance Tape Subsystem now supports the IBM Extended High Performance Cartridge Tape (MEDIA4). For specific details concerning this media, see Table 1 on page 32.

- The OAM procedure statement member has a new parameter, RESTART. This parameter provides the option of having the OAM address space automatically restart upon notification that a new SCDS has been activated. An example of the procedure statement can be found on page 51 under *Run SAMPLIB member CBRAPROC*. Details concerning the RESTART parameter are located in "Restarting OAM" on page 73.

- The OAM RESTART command (F OAM,RESTART) causes the OAM address space to perform restart processing. This command allows the operator to restart OAM without issuing a STOP and START command against the OAM address. More details can be found in "Restarting OAM" on page 73. This command can be used in conjunction with the new CBRAPROC RESTART parameter.

- A new LIBRARY DISABLE command allows customers the ability to disable cartridge entry processing on a particular system. For more information on this command, see "Disabling Cartridge Entry Installation Exit Processing" on page 78.

- New lines added to the OAM CBR1100I display generated from a D SMS,OAM command indicate the status of tape library installation exits. See "Displaying OAM Status" on page 81 for an example of this updated display.

- The F OAM,DUMP command, a streamlined version of the DUMP command, automatically collects all pertinent data needed for diagnostic purposes without the operator having to key in all the correct parameters. For more information regarding this command, see "Capturing OAM Diagnostic Data" on page 100.

- The new OAM QUERY command allows customers to query OAM to find information on optical, object tape, and tape library related requests (active, waiting, or both). Summary or detail information on any or all combinations of these requests can also be specified on this command. See "Querying Active and Waiting OAM Tape Library Requests" on page 101. This book focuses only on how this command is used to query active and waiting tape library related requests. For information concerning this command within an optical or object tape environment, refer to *OS/390 DFSMS OAM Planning, Installation, and Storage Administration Guide for Object Support*.

Summary of Changes for SC26-3051-03 DFSMS/MVS Version 1 Release 3

This book contains information previously presented in *DFSMS/MVS Version 1 Release 2 Object Access Method Planning, Installation, and Storage Administration Guide for Tape Libraries*, SC26-3051-02.

The following items relate to the 3590 Special Programming Enhancement (SPE), which introduces support for the 3590 High Performance Tape Subsystem, a new family of tape products.

The following sections describe the specific publication updates made to this book.

- OAM is expanded to provide tape library management device support for the IBM 3590 High Performance Tape Subsystem. Additionally, the IBM High Performance Cartridge Tape, exclusively used in the 3590, is also being supported. For more details on this tape subsystem and media, see "Tape Subsystems" on page 11. Also refer to the:
  - *3590 Introduction and Planning Guide*
  - *3590 User's Guide*
  - *3590 Hardware Reference*
  - *Magstar 3590 Tape Subsystem 3590 Technical Guide*
- A new media type (MEDIA3) is assigned to reflect the IBM High Performance Cartridge Tape. See Table 1 on page 32 for more details.
- Table 1 on page 32 is modified to include information on the Magstar 3590 High Performance Tape Subsystem and its supported media, High Performance Cartridge Tape.
- The new media type (MEDIA3) is added to the discussion under "Managing Multiple Media Formats" on page 33 and "Tape Device Selection Information" on page 34.
- MEDIA3 is added the discussion under "Software Volume Categories" on page 35.
- "Displaying Software Error Category Count" on page 37 is added to indicate how to display the number of scratch volumes currently in the software error category for a particular associated library.
- The DEVSUPxx PARMLIB member is now used instead of the partitioning USERMOD to change the system default category assignments whenever you partition a library. For more information, see the discussion under *Update DEVSUPxx PARMLIB member* on page 50.
- Notes concerning sharing a common TCDB in an environment with multiple systems at different levels of DFSMS/MVS are dispersed in various sections of the publication. These notes act as reminders that various functions running on pre-3590 SPE level may not include volumes, drives, or libraries known only to the 3590 SPE level systems.
- The 3590 and the 3590 media are included in the discussion under "Setting the Cartridge Loader Scratch Media Type" on page 80.
- The CBR1110I OAM message display example under "Displaying Library Detail Status" on page 86 is modified to include MEDIA3 and the number of scratch volumes in the software error category.
- More information is added to the "Displaying Tape Drive Status" on page 89 to make this section compatible with the other sections in this publication. Also, 3590-1 is added as an option for the *devtyp* and MEDIA3 is added as an option

for the cartridge loader scratch media. Additionally, the display for the LIBRARY DISPDRV,ATLF4017 command is modified to include both the 3590-1 device type and MEDIA3 ICL category.

- "Displaying Tape Volume Status" on page 94 is updated to include MEDIA3 in the list of valid *medtype*. One new volume error status (UNFORMAT), a new library category (SCRMED3), a new recording technology (128-track), and modified valid compaction modes and tape volume special attributes are added in this section.

- The discussion regarding the DEVTYPE parameter on page 109 includes the new recording technology, media type, and compaction information in support of the new 3590 media.

- A new parameter (USERID) is added under "Ejecting a Cartridge" on page 119 for the cartridge eject function. USERID indicates a TSO user ID that receives eject completion or failure messages.

- New reason code 204 (for the cartridge eject function) is added for the CBRXLCS functions. For more information concerning the CBRXLCS functions and the return and reason codes, see "Chapter 6. LCS External Services" on page 107.

- Figure 15 on page 143 and Figure 16 on page 147 are updated to include a new volume category, media type, recording technology, and compaction information.

- The discussions and parameter lists for all the installation exits in "Chapter 7. Installation Exits" on page 149 are updated to include the new recording technology, media type, and compaction values.

- The Tape Library Define ISMF panel, Figure 43 on page 248, is modified to include MEDIA3; the options for ENTRY DEFAULT USE ATTRIBUTE and the EJECT DEFAULT are changed. For the ENTRY DEFAULT USE ATTRIBUTE, P (private) or S (scratch) are used to replace the previous options of PRIVATE or SCRATCH. For the EJECT DEFAULT, P (purge) or K (keep) are used to replace the previous options of PURGE or KEEP.

- The Tape Library Display ISMF panel (Figure 47 on page 253) is updated to include MEDIA3 as a valid media type.

- The Tape Library Redefine ISMF panels (Figure 49 on page 256 through Figure 51 on page 257) and the Tape Library Alter ISMF panels (Figure 53 on page 259 through Figure 55 on page 260) are modified to accept the new media type, and the new options (P or K) for the ENTRY DEFAULT USE ATTRIBUTE and (P or S) for the EJECT DEFAULT fields.

- The Mountable Tape Volume List and the Tape Library List ISMF panels are modified to include the new media type, recording technology, and compaction values. See Figure 62 on page 268 and Figure 66 on page 272 through Figure 69 on page 273 for more information.

- In support of the DEVSUPxx PARMLIB member in partitioning tape libraries, Appendix C, "*Sample USERMODs for Tape Library Partitioning*", has been removed from this publication.

The following items refer to the base DFSMS/MVS 1.3.0 release. These items are not new for the 3590 SPE, but they were changes for the base DFSMS/MVS 1.3.0 release. They were documented in the previous hard copy version of this publication.

- The CBRAPROC SAMPLIB member example under "Update PROCLIB, by Running CBRAPROC SAMPLIB member" on page 51 is updated to include the EJECT parameter. Additionally, the example shown in "SAMPLIB Member CBRAPROC" on page 232 is also updated to indicate this parameter.

- A new table, "Tape Storage Configurations," provides details regarding library, drive, and media capacities, capabilities, recording technologies, and other pertinent information to be used as a reference throughout the book. This table can be found in Table 1 on page 32 under the "Hardware" discussion.

- Information concerning updating of the volume error status field of the TCDB when an error is detected (either hardware or software) is added under "TCDB Volume Error Status Field and Software Error Category" on page 35. Additionally, "Detecting Software Errors for Private Volumes" on page 36 is provided to describe what happens when a software error is detected for a private volume, and "Detecting Hardware Errors for Volumes" on page 36 is provided to describe the occurrence of a hardware error against a private or a scratch volume.

- Suggestions for resetting the volume error status field are discussed under "Resetting the Volume Error Status Field" on page 36. Also, instructions for showing the number of scratch volumes in the scratch media categories are described under "Displaying Scratch Volume Counts" on page 37.

- In support of the 32-system and or system group names enhancement of DFSMS/MVS 1.3.0 (refer to *OS/390 DFSMSdfp Storage Administration Reference* for more information concerning this support), some of the display examples in "Chapter 5. Operating the OAM Address Space" on page 69 for the command DISPLAY SMS,LIBRARY(library_name),STATUS and DISPLAY SMS,STORGRP(ALL) are updated to show the additional system information. Additionally, more information is added to the "Displaying Tape Drive Status" on page 89 to make this section compatible with the other sections in this publication.

- Two new reason codes are added for the CBRXLCS functions, 310 (applies to change use attribute, manual cartridge entry, cartridge eject, query volume residence, and test volume eligibility), and 311 (applies to manual cartridge entry). Reason codes 36 and 37 are deleted from the return and reason code tables. For more information, see "Chapter 6. LCS External Services" on page 107.

- A warning is added to the discussion of the SCRATCH THRESHOLD parameter indicating a threshold should be set for all media types used within the library. See on page 249 for more information on the SCRATCH THRESHOLD parameter.

- The ISMF panels for the tape library DEFINE, DISPLAY, ALTER, and REDEFINE are modified to accept up to 32-system or system group names. See Figure 44 on page 250, Figure 48 on page 255, Figure 49 on page 256, Figure 50 on page 256, Figure 54 on page 259, and Figure 55 on page 260.

Programming Support

This publication describes OAM's role in the management of tape libraries.

Device Support

This book contains information concerning OAM's role in the support of the following libraries:

- IBM 3494 Model L10 Tape Library Dataserver and the IBM 3495 Models L20, L30, L40, and L50 Tape Library Dataservers, tape libraries that automate the storage and retrieval of tape cartridges.

- IBM 3495 Model M10 Tape Library Dataserver, a manual tape library dataserver that uses the concepts of system-managed storage in a nonautomated environment.

Operator Commands

All operator commands (MVS/DFP™, DFSMS/MVS, and OAM commands) supported in previous releases continue to be supported.

Summary of Changes for SC26-3051-02 DFSMS/MVS Version 1 Release 2

This book contains information previously presented in *DFSMS/MVS Version 1 Release 1 Object Access Method Planning, Installation, and Storage Administration Guide for Tape Libraries*, SC26–3051–01.

This book contains information on OAM's support for the IBM 3494 Model L10 Tape Library Dataserver, an automated tape library that automates the storage and retrieval of tape cartridges within a data storage environment. It also introduces support for the IBM 3495 Tape Library Dataserver Model M10, a manual tape library that uses the concepts of system-managed storage to manage the tape volumes associated with it. This allows an installation to implement SMS management of tape volumes in remote locations without the added cost of automation.

In addition to the device support, the following updates and enhancements are documented in the publication for DFSMS/MVS 1.2.0:

* System-managed support for manual tape libraries and the associated tape volumes that reside in the new Magstar 3495 Tape Library Dataserver Model M10 is introduced in "Manual Tape Storage" on page 2. Information concerning OAM's support for tape libraries can be found throughout the book.
* System partitioning information in "Partitioning Tape Libraries among Multiple Sysplexes" on page 40 is included as a possible way to share tape libraries without sharing configuration databases associated with the tape libraries.
* A new LCS External Services function is presented in "Manual Cartridge Entry (MCE)" on page 107 that allows an application program to enter a volume or a list of volumes into a manual tape library dataserver.
* The Volume Not in Library Installation Exit, (CBRUXVNL) on page 172, is added to give the installation an opportunity to enter a volume located outside the library into a tape library dataserver and thereby preventing a job from failing.
* ISMF information is added in "Appendix B. ISMF Panels to Define and Monitor Your Configuration" on page 245 describing how to define, alter, audit, and monitor tape libraries and tape volumes.

Summary of Changes for SC26-3051-01 DFSMS/MVS Version 1 Release 1

This book contains information previously presented in *DFSMS/MVS Object Access Method Planning, Installation, and Storage Administration Guide for Tape Libraries*, SC26-3051-00.

This book contains information on OAM's support for the IBM 3495 Tape Library Dataserver, an automated tape library that automates the storage and retrieval of tape cartridges within a data storage environment.

DFSMS/MVS Version 1 Release 1 integrates and expands the storage and program management functions previously available in MVS/DFP Version 3 (5665-XA3),

DFHSM Version 2 (5665-329) and DFDSS Version 2 (5665-327). The functions of these prior offerings and major new functions are contained in the following four DFSMS/MVS functional components:

- DFSMSdfp™—Provides storage, data, program and device management functions.
- DFSMSdss™—Provides data movement, copy, backup and space management functions.
- DFSMShsm™—Provides backup, recovery, migration and space management functions.
- DFSMSrmm™—Provides management functions for removable media such as tape cartridges, reels, and optical volumes.

For more information on the DFSMSdss, DFSMShsm, and DFSMSrmm components of DFSMS/MVS, refer to the appropriate publications listed in "Related Publications" on page xiv.

Chapter 1. Introduction to Tape Library Management

The Object Access Method (OAM) is a component of DFSMSdfp, the base of the Storage Management Subsystem (SMS) of DFSMS. OAM uses the concepts of system-managed storage, introduced by SMS, to manage, maintain, and verify tape volumes and tape libraries within a tape storage environment.

Note: The management of data on tape volumes is not discussed in this manual. Refer to *OS/390 DFSMS OAM Planning, Installation, and Storage Administration Guide for Object Support* for information on OAM's role in the storage of objects on tape volumes. Also, refer to *OS/390 DFSMSrmm Guide and Reference* for the role of DFSMSrmm in the management of data on tape volumes.

In general, a tape library is a set of tape volumes and the set of tape drives where those volumes may be mounted. The relationship between tape drives and tape volumes is exclusive; a tape volume residing in a library (*library-resident tape volume*) can only be mounted on a tape drive contained in that library (*library-resident tape drive*), and a library-resident tape drive can only be used to mount a tape volume which resides in the same library. A tape library can consist of one or more IBM 3490, 3490E, or 3590 subsystems, each connected to the library manager application. The tape library can be automated as in the Magstar 3495 Tape Library Dataserver Models L20, L30, L40, and L50, or the Magstar 3494 Tape Library Dataserver, or it can be manual as in the Magstar 3495 Tape Library Dataserver Model M10.

When a volume is entered into a tape library, it is assigned to a tape storage group. A tape library can contain volumes from multiple storage groups, and a storage group can reside in up to eight libraries.

As new tape data sets are created, the installation allocates data sets to tape volumes in an SMS-managed tape library by associating one or more tape storage group names (using the SMS storage group ACS routine) with the allocation request. DFSMS ensures that only tape devices within the tape libraries associated with the tape storage groups are allocated to the request. Existing tape data sets on library-resident volumes are allocated to tape drives within the library where the volume resides.

Automated Tape Storage

Tape automation provides satisfactory solutions for many of the problems that occur when tape library storage requires human intervention. Mount times are reduced from minutes to seconds. The number of lost, misfiled, or damaged tapes decreases. Security is enhanced because the tape library hardware and tape cartridges can be kept in a secure area. Customers experience the benefits of a cost-effective, efficient, and automated method for storing their tape media, and they drastically reduce the amount of human intervention required to maintain their tape storage environments.

The automated tape library dataserver (ATLDS) and its supporting software streamlines and automates the roles of the storage administrator, tape operator, and the tape librarian, and uses the concepts of SMS to manage the tape volumes within the library.

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For a discussion of the Magstar 3495 Tape Library Dataserver and the Magstar 3494 Tape Library Dataserver, see "Subsystem Attachment 3495 ATLDS" on page 8 and "Subsystem Attachment 3494 ATLDS" on page 10.

Automated Tape Library Dataserver

An automated tape library dataserver (ATLDS) consists of tape drives, tape cartridges, a tape cartridge storage area, input and output stations for inserting and removing cartridges, and a mechanism for moving tape cartridges among these areas. The volumes within an automated tape library are known as library-resident tape volumes. Tape volumes can also be located on shelves outside the automated tape library. These volumes are known as shelf-resident tape volumes. See Figure 1 on page 9 and Figure 2 on page 11 for examples of the Magstar 3495 Tape Library Dataserver and the Magstar 3494 Tape Library Dataserver.

Tape cartridges are stored and retrieved by an automated cartridge accessor. The cartridges are placed in an input station by the tape library operator. The cartridge accessor then scans the external volume label on the cartridge, carries the cartridge to the appropriate storage location, and places it into the library. When a volume mount is requested, the cartridge accessor retrieves the cartridge from the storage location, carries it to the requested drive, and mounts the cartridge in the drive. Upon completion of the tape operation, the tape cartridge is unloaded, the accessor retrieves it from the drive, and returns it to a storage location in the library.

However, the tape library operator can continue library operation during periods when the cartridge accessor is not operational. During this time the operator responds to commands displayed on the manual mode console. This is known as manual mode operation.

Manual Tape Storage

Manual tape library management provides the advantages of system-managed tape in a nonautomated environment.

The tape operator uses the library manager console to receive tape instructions. These library volumes can be kept on a shelf near the library tape drives, which allows quicker response times for mounts and demounts and less misplacement of tape cartridges.

The capability of grouping volumes and drives provides system-managed support for manual tape library dataservers in remote locations.

For a discussion of the Magstar 3495 Tape Library Dataserver Model M10, see "Subsystem Attachment 3495 MTLDS" on page 17.

Manual Tape Library Dataserver

A manual tape library dataserver (MTLDS) is an installation-defined set of tape drives and the set of volumes that can be mounted on the drives. The volumes are physically stored in shelf storage located near the MTLDS, but since they are specifically defined as residing in the MTLDS, they are known as library-resident volumes. When the volumes are ejected from the manual tape library, they become shelf-resident volumes. See Figure 3 on page 17 for an example of the Magstar 3495 Tape Library Dataserver Model M10.

In an MTLDS environment, the operator or tape librarian responds to commands at the library manager console. The operator manually loads and unloads the tape cartridges.

Cartridges can be entered in a manual tape library dataserver at the library manager console or through invocation of the CBRXLCS manual cartridge entry (MCE) general-use programming interface (see "Manual Cartridge Entry (MCE)" on page 107 for more information).

Object Access Method Support for Tape Libraries

OAM uses system-managed storage concepts within the SMS component of DFSMS to provide the management facilities for the physical movement and tracking of the tape volumes used within tape libraries.

There are three components of OAM:
- Object Storage and Retrieval (OSR)
- OAM Storage Management Component (OSMC)
- Library Control System (LCS)

This manual covers the use of the LCS component of OAM in support of tape libraries. For information on the roles of OSR, OSMC, and LCS in support of object data, refer to *OS/390 DFSMS OAM Planning, Installation, and Storage Administration Guide for Object Support*.

OAM provides the following services in support of tape libraries:
- Cartridge entry, eject, audit, mount, and demount processing
- Operator command processing
- Tape configuration database (TCDB) management
- A set of tape library related services which may be used by the installation (see "Chapter 6. LCS External Services" on page 107)
- Installation exits that influence tape processing at four critical points:
  - Entering a cartridge into a tape library, or importing logical volumes into a VTS
  - Ejecting a cartridge from a tape library, or exporting logical volumes from a VTS
  - Changing the use attribute of a tape cartridge
  - Allowing the installation to enter a nonlibrary-resident cartridge into a tape library during allocation processing

  See "Chapter 7. Installation Exits" on page 149 for more information on these installation exits.
- Unsolicited attention message processing.

Only a subset of the functions above actually execute within the OAM address space (entry, eject, audit, and unsolicited attention message processing). Cartridge mount and demount activity (job processing) does not require the OAM address space. However, since job processing often results in volumes being entered and error and status messages being displayed, it is recommended that the installation run with the OAM address space active whenever possible.

ISMF Role with Tape Library Dataservers

The storage administrator performs library-related functions through the use of the Interactive Storage Management Facility (ISMF) library management panels.

ISMF serves two roles in tape library management. First, it allows the storage administrator to define tape libraries in the tape configuration database (TCDB).

Second, it allows the storage administrator to define tape libraries in specified source control data sets (SCDSs), making them a part of the SMS configuration when that SCDS is activated. Upon activation of an SCDS that has tape libraries defined, an operator on any console within an SMS complex can issue commands targeted for any tape library within the SMS configuration. Each change associated with an SCDS does not take effect until that SCDS is activated. Changes to the TCDB take effect the next time an SCDS that includes that tape library is activated.

Note: Tape drives associated with either an automated tape library dataserver or a manual tape library dataserver must be defined using the hardware configuration definition (HCD). For more information on HCD requirements, refer to "Creating the Hardware Configuration" on page 54 and to *OS/390 HCD User's Guide*.

ISMF allows the storage administrator to define, alter, list, and display:
- Tape library definitions
- Tape storage group definitions
- Data class definitions
- Storage class definitions

Managing the tape library's volume inventory is also handled through ISMF. For more detailed information, refer to "Appendix B. ISMF Panels to Define and Monitor Your Configuration" on page 245 and *OS/390 DFSMS: Using the Interactive Storage Management Facility*.

Installation Storage Management Policy Overview

Each installation defines a storage management policy that allows effective tape storage management without requiring user intervention. Through ISMF, the storage administrator and system programmer define an installation storage management policy in an SMS configuration.

An SMS configuration for tape libraries consists of the following elements:
- **Base configuration.** The base configuration identifies the systems and system groups in an SMS complex and contains installation defaults.
- **SMS constructs.** Constructs are lists of attributes that are assigned to data sets and storage areas. An SMS configuration can contain five construct types. The following describes all five constructs; however, SMS-managed tape uses only: storage group, storage class, and data class.
  - **Storage group** allows you to define a storage hierarchy and manage that hierarchy as if it were one large, single storage area.
  - **Storage class** allows you to define different levels of performance objectives and availability requirements for system-managed storage.
  - **Data class** allows you to define specific data attributes.
  - **Management class** allows you to define different backup, retention, and class transition characteristics.
  - **Aggregate group** allows you to group a collection of data objects that form a data type. This allows the data to be referred to collectively or individually.

An SMS configuration can contain multiple constructs of each type.

System Groups in an SMS Configuration

The systems that share the SMS configuration may be defined in one of two ways:
- As an individual system (the name of the system is known to SMS)

- As part of a system group (only the name of the group is known to SMS). There can be a maximum of 32-systems, system-group names, or both sharing the SMS configuration.

Although a system group may be defined to SMS, it is recommended that all systems connected to a tape library be defined as individual systems. If the tape library is connected to a system group, the installation loses the ability to vary the library online or offline to the individual systems that comprise the group. A VARY SMS,LIBRARY command directed to a system group causes the library to be varied online or offline to all the individual systems in the group. There is no way to direct a VARY SMS,LIBRARY command to an individual system that is part of the system group.

Storage Groups and Automated Class Selections

A tape storage group is a collection of tape cartridges that are located within one or more tape libraries. Only a tape storage group may be used in association with tape libraries. As part of the definition of a tape storage group, one to eight library names can be associated with the tape storage group. Tape storage groups can have on each system or system group in the SMS complex any one of the following four attributes:

ENABLED
> The system can create and access data sets on any tape volume belonging to this storage group. This condition *can* be changed by the VARY SMS,STORGRP operator command.

NOTCON
> The system cannot create or access data sets on any tape volume belonging to this storage group. This condition *cannot* be changed by the VARY SMS,STORGRP operator command.

DISNEW
> The system cannot create a new data set which is the first data set on a tape volume. It can read an existing data set, extend an existing data set, and create a new data set that is not the first on a tape volume. This condition *can* be changed by the VARY SMS,STORGRP operator command.

DISALL
> The system cannot create or access data sets on any tape volume belonging to this storage group. This condition *can* be changed by the VARY SMS,STORGRP operator command.

Tape storage groups can be associated with one or more tape libraries, but all volumes of a multivolume data set *must* be contained within a single library and a single storage group. If one of the volumes required in a multivolume data set request resides outside of the library, the volume not in library installation exit (CBRUXVNL) can be used to direct the volume back into the library.

When a private volume is entered into a tape library and the cartridge entry installation exit does not supply a storage group name, OAM sets the storage group name to blanks. The blank storage group name becomes the system default. The blank storage group is always enabled on all systems within the SMS complex.

It is a good idea for the storage administrator to assign all volumes in the blank storage group to other named storage groups as soon as possible. This allows an installation to take advantage of the storage group states (ENABLED, NOTCON,

DISNEW, and DISALL). Also, the storage group name can be used to direct a volume to a particular library or libraries, rather than to any library within the SMS complex. This ensures that a volume is reentered into the appropriate library following the ejection of that volume, and provides a filter for reducing the length of the volume list displayed through ISMF.

Automated class selection (ACS) routines are storage-administrator-defined routines that automatically identify the storage class, storage group, and data class that are used for allocation of volumes for new tape data sets. The storage group definitions in the active control data set (ACDS) contain the names of the libraries to which these volumes may be assigned. During allocation, these library names are used to find the associated named collection of tape devices or *device pool*. The device pool names are then used during allocation to find the associated device numbers for the tape drives that may be used to satisfy the request.

Note: When both DASD and tape storage groups are eligible for a new allocation through the ACS routine, SMS defaults to DASD over the tape storage group, choosing the more efficient device. The user cannot influence this decision after the ACS routine has made the storage group selection.

Pre-ACS Routine Exit

The pre-ACS routine exit (IGDACSXT) enables an external source, such as a tape management system, to provide input (through read-only variables) to the ACS routine to influence construct selection and assignment. The tape management system can use these variables to direct new allocations to a particular tape library to coordinate vaulting runs for backups or offsite storage. For more detailed information regarding this pre-ACS routine exit, refer to *OS/390 DFSMS Installation Exits*.

Integrated Catalog Facility and the Tape Configuration Database

The integrated catalog facility (ICF) provides support for the following tape configuration database:

Volume catalog. A volume catalog (VOLCAT) is an ICF user catalog marked as a volume catalog. It contains only volume and library entries. There are two types of VOLCAT: general and specific. The TCDB may be shared by all or some of the systems and system groups in one or more SMSplexes that have connection to the tape library dataservers that are defined in the TCDB. The TCDB is the collection of all VOLCATs—the general and all the specifics.

The general VOLCAT
> The default volume catalog contains all the library records as well as any volume records that are not recorded in a specific VOLCAT. Each system must have access to one and only one general VOLCAT. The general VOLCAT must be defined prior to defining a tape library. The name of the general volume catalog is hlq.VOLCAT.VGENERAL.

A specific VOLCAT
> A volume catalog that contains a specific group of volume records based on the first character of the volume serial number. The name of the specific volume catalog is hlq.VOLCAT.Vx. For examples on defining VOLCATS, refer to "Creating the Tape Configuration Database" on page 52 or *OS/390 DFSMS Access Method Services for Catalogs*.

Note: The "hlq" and the "x" in the name of the volume catalog, **hlq.VOLCAT.Vx**, stand for high-level qualifier and reference to valid character values (A–Z and 0–9) respectively. For information on changing high-level qualifiers on VOLCATs, refer to *OS/390 DFSMS: Managing Catalogs*.

The following TCDB records are used in association with tape libraries:

- **Library record.** There is one library record for each tape library. The library record resides within the general VOLCAT. Each record contains information related to the library (for example, library name, library ID, and device type) and is created by the ISMF tape library define option.
- **Volume record.** Each volume record represents a tape volume. It can reside in the general or specific VOLCAT. It contains information related to a volume (for example, volume serial number, library name, and storage group name) and is created during cartridge entry processing.

Access method services provide users access to catalog entries for tape libraries and tape volumes, allowing them to create, alter, list and delete entries residing in the TCDB. However, access method services is used mainly as a recovery tool to repair damaged catalogs and should be used with caution whenever you create, alter, and delete TCDB entries. Incorrect use of this recovery tool can cause database (host, library manager, and tape management) conflicts. For example, IDCAMS ALTER can be used to change the use attribute of a volume in the TCDB, but it does not change the library manager's inventory record or the tape management system's database. When changing a volume's use attribute, use CBRXLCS FUNC=CUA or ISMF volume ALTER to keep the databases synchronized. For more information concerning recovery of catalog entries, see "Establishing Recovery Procedures" on page 64.

MVS Hardware Configuration Definition

MVS hardware configuration definition uses the LIBRARY parameter to define drives configured to a tape library. For more information on using HCD to define drives, refer to "Creating the Hardware Configuration" on page 54 and to *OS/390 HCD User's Guide*.

Note: Tape drives associated with an automated tape library dataserver, a manual tape library dataserver, or as a stand-alone device must be defined using the hardware configuration definition (HCD).

Types of Tape Volumes

Unlike DASD or optical volumes, which are shared among many users, tapes are assigned to individuals or functions. They are retained for specified periods of time as required by the storage administration plan for your business. Tape cartridges that are assigned to a specific individual or function are considered *private*. Unassigned tapes are known as *scratch* and are used in response to a system scratch request, or assigned as a private tape in response to a nonspecific request from a user. The volume use attribute (whether the cartridge is private or scratch) is initially assigned by the cartridge entry installation exit (CBRUXENT) or set by the ISMF entry default use attribute.

Private Tape Management

You can use private volumes by explicitly requesting a specific volume serial number.

Scratch Tape Management

All scratch tapes within a library are contained within common scratch pools—one for each type of media in the library—and cannot be explicitly mounted by specifying a volume serial number. See page 249 for more information on scratch threshold processing. Once a tape is removed from a common scratch pool, it is assigned to a storage group, the volume use attribute is changed to private, and it remains private until it is returned to scratch status.

Private tapes are returned to the common scratch pool through an ISMF ALTER request, through the use of the Library Control System (LCS) external services change use attribute function, or by a tape management system.

VTS Stacked Tape Management

OAM does not keep volume records in the tape configuration database (TCDB) for the physical stacked volumes used in the VTS. However, when logical volumes are exported from a VTS, the stacked volumes containing the logical volumes are reported through messages and passed to the cartridge eject installation exit (CBRUXEJC). This is done so that a tape management system can track the physical stacked volume on which an exported logical volume resides.

Duplicate Volume Management

Special care must be taken to mount a volume with a duplicate volume serial number outside of an IBM managed tape library. When the duplicate volume serial number is requested, if a volume record exists for that volume in the tape configuration database (TCDB) indicating that the volume is library resident, the allocation for that request will be directed to the library in which the volume resides. To direct the allocation of the duplicate volume to a stand-alone device, a special reserved storage class name, DUPT@SMS, can be specified with the storage class parameter on the JCL with DISP=OLD. This will force allocation of this request to a stand-alone device.

Subsystem Attachment 3495 ATLDS

The Magstar 3495 Tape Library Dataserver is attached to host systems by a communications path to an IBM 3490 or 3490E control unit with the addition of a library attachment facility feature. The feature provides a microprocessor card and attachment cable for connection of each 3490 or 3490E control unit path to the library manager application. The equivalent of the library attachment facility is built into the control unit for an IBM 3590. See "Subsystem Attachment 3494 ATLDS" on page 10 for more information concerning these subsystems.

The ATLDS (see Figure 1 on page 9) is capable of supporting multiple control units and tape drives. The details for each callout in Figure 1 on page 9 are explained in the text that follows. See Table 1 on page 32 for more information concerning configuration capabilities, and "Subsystem Attachment 3494 ATLDS" on page 10 for more details concerning the tape subsystems. For more detailed information regarding the hardware features of the Magstar 3495 Tape Library Dataserver, refer to *3495 Tape Library Dataserver Introduction.*
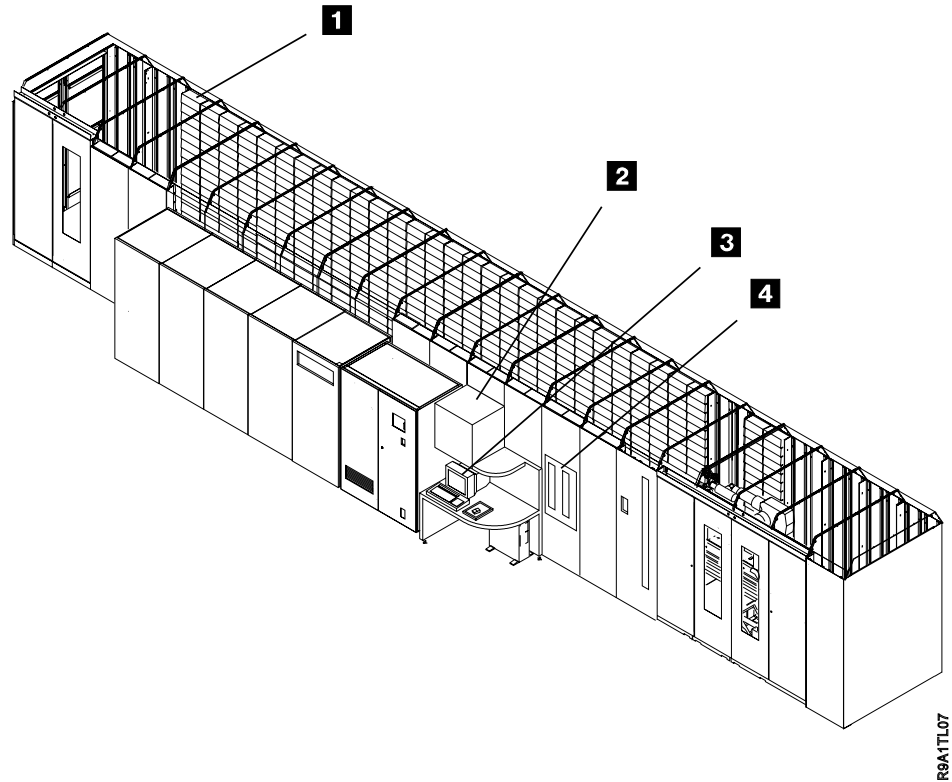
Figure 1. IBM 3495 Automated Tape Library Data Server

High Capacity Input and Output Facility

All 3495 ATLDS models can have an optional high-capacity input and output facility (Figure 1, item **1**) that reserves a section of the cartridge storage area to be used for input and output of large numbers of cartridges. This optional facility requires that the tape library be placed in *paused mode* (indicating that the cartridge accessor is not active) while the areas are being loaded and unloaded. The software term for the process of ejecting cartridges into the high-capacity output station is known as *bulk eject*, and the software term for the process of entering cartridges into an automated tape library dataserver using the high-capacity input station is known as *bulk entry*.

External High-Capacity Input and Output Facility

The optional external high-capacity input and output station feature (not shown in Figure 1) allows the operator to add or remove up to 240 cartridges from the Magstar 3495 Tape Library Dataserver without pausing automated operations or without the operator entering the 3495 enclosure.

Note: If the external high-capacity input and output station feature is installed, the high-capacity input and output facility cannot be enabled.

Manual Mode Terminal

A manual mode terminal (Figure 1, item **2**) is located in the enclosure of the tape library and is used to assist the operator with manual mode operations when the

cartridge accessor is not active. The library manager uses the manual mode terminal to inform the operator which volumes to mount and eject, and where to locate the volumes in the storage cells.

Library Manager Application

The library manager (Figure 1 on page 9, item **3**) is a licensed internal code application installed in the library controller that controls all operations in the tape library. The library manager controls tape library automation, communicates with the host through each control unit, and allows communication paths for operators and service personnel. The library manager is also used for service and test sessions and provides operator status information and control panels for the operator's use. Transaction logs and an error log are also provided as problem determination aids. For more information concerning the library manager for the 3495, refer to the *3495 Tape Library Dataserver Introduction* and the *3495 Tape Library Dataserver Operator's Guide.*

Commands are processed by the library manager and translated into requests for cartridge movement or database processing. The library manager database provides a cross-reference between a volume serial number, a volume's actual storage location, and a volume's category. See "Displaying Tape Volume Status" on page 94 for a list of valid volume categories and their descriptions.

Convenience Input and Output Facility

Each tape library has a convenience input and output station (Figure 1 on page 9, item **4**) for inserting cartridges into and ejecting cartridges from the tape library, without requiring the pausing of automated operations or operator entry into the tape library enclosure area. Each convenience input and output station has a capacity of 20 cartridges.

For more information on these hardware features, refer to *3495 Tape Library Dataserver Introduction.*

Subsystem Attachment 3494 ATLDS

The Magstar 3494 Tape Library Dataserver (Figure 2 on page 11) can be attached to host systems by two methods. The first method is attachment to host systems by a communications path to the control unit of an IBM 3490E or an IBM 3590, or a combination thereof. The second attachment method stems directly from the library manager to AS/400® hosts through a host attachment feature. This attachment provides direct communication between the AS/400 host and the 3494 library manager.

The details for each callout in Figure 2 on page 11 are explained in the text that follows.

This ATLDS is capable of supporting multiple control units and tape drives. See Table 1 on page 32 for more information concerning configuration capabilities. For more detailed information on the hardware features of the Magstar 3494 Tape Library Dataserver, refer to *3494 Tape Library Dataserver Introduction and Planning Guide*, and *MAGSTAR 3494 Tape Library Operator's Guide.*
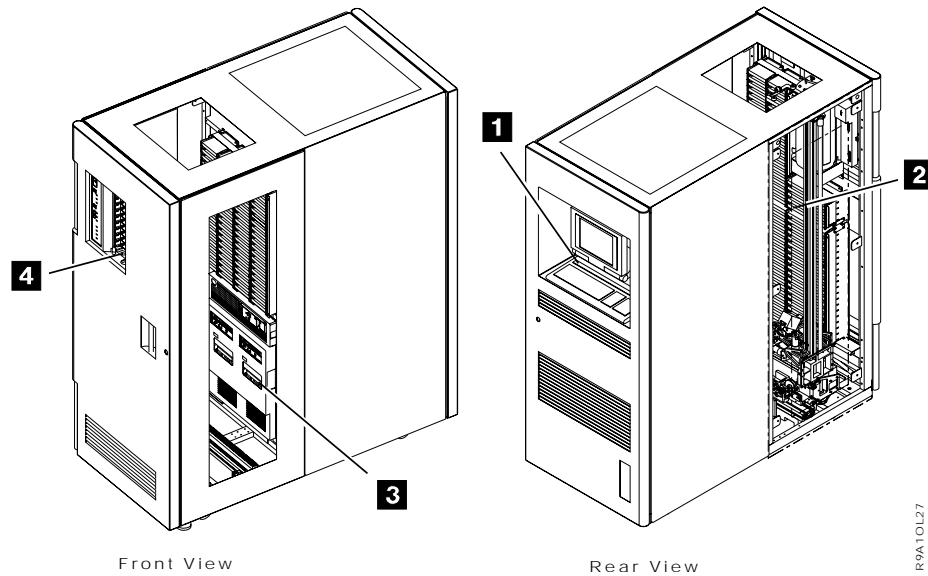
Figure 2. IBM 3494 Model L10 Automated Tape Library Dataserver

Cartridge Storage Cells

The cartridge storage cells (Figure 2, item **2**) are used to store the tape cartridges associated with this ATLDS. IBM Cartridge System Tape, IBM Enhanced Capacity Cartridge System Tape, IBM High Performance Cartridge Tape, and IBM Extended High Performance Cartridge Tape are supported. For more information concerning cartridge capacities for the various configurations of the Magstar 3494 Tape Library Dataserver, refer to *3494 Tape Library Dataserver Introduction and Planning Guide.*

Tape Subsystems

The 3494 uses the 3490E Magnetic Tape Subsystem and the Magstar 3590 High Performance Tape Subsystems, individually or in combination (Figure 2, item **3**). Each subsystem has its own integrated control unit. The 3490E models can read cartridges written by other 3480 and 3490 base models. For more information concerning the IBM 3490E models, refer to *3490 Introduction.*

The Magstar 3590 Model B High Performance Tape Subsystem is capable of coexisting with 3490 and 3490E devices in the Magstar 3495 Tape Library Dataserver and with 3490E and 3590 Model E devices in the Magstar 3494 Tape Library Dataserver, or as a stand-alone tape drive. The 3590 consists of a controller and drive integrated in the same unit. The 3590 can be configured as a frame-mounted or rack-mounted model that is capable of ESCON® attachment to the Magstar 3495 Tape Library Dataserver. It can also be configured for use within the Magstar 3494 Tape Library Dataserver.

The Magstar 3590 Model E High Performance Tape Subsystem is capable of coexisting with 3490E and 3590 Model B devices in the Magstar 3494 Tape Library Dataserver in 3590-1 emulation mode only, or as a stand-alone tape drive in 3490E or 3590-1 emulation mode. However, inside a 3494 Tape Library Dataserver, the 3590 Model E Tape Subsystem is recognized by the SMStape software support as a 3590 Model E device rather than by what it is emulating. This enables both 3590 Model B and 3590 Model E devices to coexist in the same library. The 3590 Model E Tape Subsystem can read cartridges written by the 3590 Model B Tape Subsystem.

The 3590 tape subsystems uses the IBM High Performance Cartridge Tape and the IBM Extended High Performance Cartridge Tape. These 1/2 inch magnetic medias provide serpentine 16-track recording with 8 passes (3590 Model B) making it capable of 128-track recording technology or with 16 passes (3590 Model E) making it capable of 256-track recording technology. This allows the user to take advantage of increased capacity and improved device speed.

The 3590 expands the storage capabilities and performance for these libraries by providing higher performance, a larger capacity cartridge, and increased reliability over previous tape subsystems. For more details on the Magstar 3590 High Performance Tape Subsystem, refer to the *3590 Introduction and Planning Guide*, and *Magstar 3590 Tape Subsystem 3590 Technical Guide.*

Convenience Input and Output Station

The convenience input/output station (Figure 2 on page 11, item **4**) is an optional feature on the 3494 that is used for inserting cartridges into or ejecting cartridges from the ATLDS, without interrupting normal automated operations. For more detailed information on the convenience input/output features of the Magstar 3494 Tape Library Dataserver, refer to *3494 Tape Library Dataserver Introduction and Planning Guide.*

High Capacity Input/Output Facility

The high-capacity input/output facility (not shown) is an option that reserves a section of the cartridge storage area to be used for the input/output of cartridges. Either a high capacity output facility or a high capacity input/output facility can be defined, but not both.

Library Manager Application

The library manager (Figure 2 on page 11, item **1**) is a licensed internal code application installed in the library controller that controls all operations in the tape library. The library manager communicates with the host through each control unit, and allows communication paths for operators and service personnel. The library manager is also used for service and test sessions and provides operator status information and control panels for the operator's use. Transaction logs and an error log are also provided as problem determination aids. For more information concerning the library manager for the 3494 ATLDS, refer to *3494 Tape Library Dataserver Introduction and Planning Guide.*

Virtual Tape Server Subsystem of the ATLDS

The virtual tape server (VTS) subsystem (not pictured) in an ATLDS combines the random access and high performance characteristics of DASD with outboard hierarchical storage management and virtual tape devices and virtual tape volumes, providing significant reductions in the number of physical cartridges, devices, and automated libraries needed to store customer data. There are several key concepts of this subsystem:
- Emulation of 3490-type tape devices (virtual devices)
- Emulation of 3490-type tape volumes (virtual volumes)
- Tape volume cache
- Storage management of the tape volume cache
- Maintaining data fragments from migrated volumes
- Fast response for nonspecific mount requests
- Use of the Magstar 3590 High Performance Tape Subsystem
- Automatic 3590 storage capacity utilization

- Logical library partitioning
- Operator interface with the library manager
- Logical volume inventory

Emulation of 3490-Type Tape Devices (Virtual Devices)

From a host perspective, the virtual subsystem looks like two or four 3490E control units, each with 16 tape devices. Each emulated device is called a virtual tape device. The virtual subsystem handles all 3490 tape commands. Emulating a 3490-type tape device eliminates the need for host software changes to support the 3590-type tape device. There is no direct relationship between a virtual tape device and a real 3590 tape device. Each virtual device:

- Has a host device address
- Is included in the I/O generation for the system
- Is varied online or offline to a host
- Signals ready when a virtual volume is loaded
- Responds to and processes all 3490E tape commands
- Becomes not ready when a virtual volume is rewound and unloaded
- Indicates that it has a cartridge loader
- Can be associated with a pool of scratch volumes that allow very fast mount access for scratch mounts

  Note: The active status of the cartridge loader depends on the availability of scratch volumes in the assigned pool.

Data is written and read as if it is stored on a real Standard or Enhanced Cartridge System Tape; however, within the subsystem it is really stored on DASD. All tape read and write commands are translated to read and write data records to or from DASD. Volumes residing on the DASD are called virtual volumes. For more information concerning virtual volumes, see "Emulation of 3490-Type Cartridges (Virtual Volumes)".

All host interactions with data in a VTS are through virtual volumes and associated virtual tape devices; there is no direct access to the data on a physical cartridge or device.

Emulation of 3490-Type Cartridges (Virtual Volumes)

The virtual tape server (VTS) subsystem in a 3494 ATLDS uses virtual volumes for all interactions with host software. These virtual volumes and the data associated with them are stored in the tape volume cache not on a physical tape device or volume when they are being used by the host system. For more information on tape volume cache, see "Tape Volume Cache" on page 14 and refer to *Magstar 3494 Introduction and Planning Guide.* These virtual volumes emulate the functional characteristics of a cartridge system tape. Each virtual volume:

- Has a unique volume serial number
- Is loaded and unloaded on a virtual device
- Supports an IBM Standard Label
- Can be appended to after it was initially written from the beginning of the tape
- Signals the end of volume when the total number of bytes written reaches 400 MB for the emulated Standard Cartridge System Tape
- Signals end of volume when the total number of bytes written reaches 800 MB for the emulated Enhanced Capacity Cartridge System Tape
- Has an advantage over a physical volume because the mount response time for a virtual volume request, specific (when in cache) or nonspecific, is faster, since there is no dependency on the physical movement of a cartridge or the loading delays of a physical drive

The tape volume cache of the virtual tape server enables the utilization of the 3590 tape technology. When a virtual volume is copied from tape volume cache to a 3590 cartridge, the volume then becomes a logical volume. A 3590 cartridge that contains logical volumes is referred to as a *stacked volume*. The VTS stacks multiple host created volumes onto a 3590 cartridge to create a stacked volume. The 3590 volumes used in a library that are used for stacking are identified through their volume serial numbers. When a 3590 cartridge, identified as a stacked volume, is inserted into a library, it becomes part of the volumes managed by the VTS and is not reported to the host as a newly inserted volume. Only the logical volumes specified at the library manager console are reported to the host. By buffering host created volumes, then later stacking them on a 3590 cartridge, the cartridge capacity of the 3590 technology is fully utilized. The cartridges used with this volume stacking technology emulate Cartridge System Tape or Enhanced Capacity Cartridge System Tape to the host system. When a logical volume is moved from a 3590 cartridge to the tape volume cache, the volume becomes a virtual volume again.

VTS Subsystem Import and Export Functions

The virtual tape server (VTS) subsystem provides the ability to physically import (enter) and export (remove) logical volumes within the VTS. This support includes managing the physical removal of the 3590 cartridges containing stacked logical volumes from a VTS and the corresponding function for entering these cartridges into a VTS. These functions require interaction with the host and the tape management system software. See "Exporting Logical Volumes from a VTS Subsystem" on page 27 and "Importing Logical Volumes into a VTS Subsystem" on page 19 for more information.

Tape Volume Cache

The tape volume cache consists of a high performance array of DASD and storage management software. Virtual volumes are held in the tape volume cache when they are being used by the host system. Outboard storage management software manages which virtual volumes are in the tape volume cache and the movement of data between the tape volume cache and physical devices. See "Pre-ACS Routine Exit" on page 6 for more information. The size of the DASD is made large enough so that more virtual volumes can be retained in it than just the ones currently associated with the virtual devices. After an application modifies and closes a virtual volume the storage management software in the subsystem makes a copy of it onto a physical tape. The virtual volume remains available on the DASD until the space it occupies reaches a predetermined threshold. Leaving the virtual volume in the DASD allows for fast access to it during subsequent requests. The DASD and the management of the space used to keep closed volumes available is called *tape volume cache*. Performance for mounting a volume that is in tape volume cache is quicker than if a real physical volume is mounted.

Storage Management of the Tape Volume Cache

Storage management software in the subsystem manages the contents of the tape volume cache. Virtual tape volumes are migrated from the tape volume cache to physical tape when they are no longer needed for fast access and recalled from tape to the tape volume cache when they are again requested to be mounted. The storage management software stacks multiple migrated files onto a 3590 tape, thereby utilizing its storage capacity. For more information on this volume stacking concept, see "Emulation of 3490-Type Cartridges (Virtual Volumes)" on page 13.

Maintaining Data Fragments from Migrated Volumes

When a virtual tape volume is no longer needed in the tape volume cache, the data it represents is not completely removed. A fragment of the data is kept on DASD. The data fragment includes information about the migrated virtual volume so that it can be recalled and it also includes the first several records from the last use of the volume.

Fast Response for Nonspecific Mount Requests

When a nonspecific mount is requested, data is written from the beginning of the tape, overwriting any existing data on the tape. Within a VTS subsystem, a nonspecific mount request is satisfied by accessing the data fragment in the tape volume cache associated with the virtual volume selected by the library manager to satisfy the request. No recall of the data from the previous usage of the volume is performed because the fragment contains the label information needed by the host tape management software to validate the use of the volume for a nonspecific mount request. The subsystem signals the host that the mount is complete when the fragment is accessed. The result is a very low mount response time because no physical movement or mounting of a cartridge is involved.

Using the 3590 Storage Capacity

One of the key features of the VTS is its capability to automatically use the 3590 tape technology cartridge storage capacity. With a VTS, volumes being created by the host applications are stored in a tape volume cache which is built from DASD devices. The size of the tape volume cache is greater than the capacity of a 3590 cartridge. The tape volume cache can potentially contain hundreds of tape volume images called virtual volumes, depending on the size of the volumes and tape volume cache. Through tape volume cache management policies, the VTS moves virtual volumes from the tape volume cache to a 3590 cartridge managed by the VTS subsystem. As virtual volumes are moved from the tape volume cache, they are stacked end to end on the cartridge and take up only the number of bytes written by the host, effectively using all of the storage capacity of the cartridge.

Logical Library Partitioning

To support the requirement that virtual tape server subsystems coexist with current 3490 and native 3590 subsystems in the same library, the library manager partitions the physical library into logical libraries: one library for *each* VTS subsystem (a physical library can contain up to two VTS subsystems) and another that contains all other subsystems. This must be done because a virtual tape server subsystem presents the image of 3490-type tape device and yet cannot read or write a real 3490 cartridge. By placing a virtual tape server subsystem in its own logical library, host software will not be able to attempt to allocate a virtual tape server device for a real 3490 mount, and likewise, the other way around.

A logical library can contain:
* A single virtual tape server subsystem
* The native 3490 or 3590 subsystems

Each logical library will have its own unique library sequence number and will look like a separate physical library to the hosts attached to the subsystem in that partition. The physical assets used by the subsystem are managed by the library manager in the library.

Operator Interface

The library manager console is used to perform the setup, management, and status functions needed to support a VTS subsystem.

Logical Volume Inventory

The database in the library manager is expanded to handle the large number of logical volumes that a VTS subsystem uses. There are also operator functions that allow you to add logical volumes by specifying a volume serial number range through the library manager console.

For more information concerning the usage, configuration, and characteristics of the virtual tape server, refer to *Magstar 3494 Introduction and Planning Guide.*

Peer-to-Peer Virtual Tape Server Subsystem

The Peer-to-Peer VTS Subsystem addresses data availability, system availability, remote copy and data vaulting desires for the VTS family, which consists of two Model B18s and one or two Model CX0 Auxilary frames with four Model AX0 Virtual Tape Controllers. The Model B18s provide virtual tape function for two 3494 libraries. The Model AX0 Virtual Tape Controllers exist between MVS hosts and multiple B18s to provide replication, transparent tracking, and synchronization of the Logical Tape volumes. The Peer-to-Peer VTS provides multiple copies of all tape data.

The Peer-to-Peer VTS Subsystem supports an immediate or deferred copy option. In deferred copy mode, the library schedules creation of the copy upon receiving the rewind/unload command from the host. The copy is then made in the background as VTS activity permits. In immediate copy mode, the copy is started upon receiving the host rewind/unload command and signals completion of the rewind/unload command when the copy operation is complete.

The Peer-to-Peer VTS Subsystem appears as one library image to the attached hosts. The single library image is referred to as the composite library. The underlying physical VTS libraries that make up the composite library are referred to as the distributed libraries. All three libraries (the composite library and two distributed libraries) will be defined to the host, whereas the drives and volumes will be defined and associated with the composite library.

The composite library will reflect the overall state of the VTS subsystems, with individual library status being reflected through the distributed libraries. For example, if one of the distributed libraries is in paused mode and the other is in automated mode, the overall status of the VTS composite library will be automated with messages to the host indicating which of the distributed libraries is paused. If one of the distributed libraries is taken offline at the library, the state of the composite will remain online and operational as long as one of the distributed libraries is operational.

Note: The Import/Export feature is not supported in a Peer-to-Peer VTS Subsystem.

Subsystem Attachment 3495 MTLDS

The MTLDS is attached to host systems by a communications path to an IBM 3490/3490E Model A01, A02, A10, or A20 control unit with the addition of a library attachment facility feature. This feature provides a microprocessor card and attachment cable for connecting each 3490/3490E control path to the library manager application.

The MTLDS (Figure 3, item **1**) supports up to four control units and 64 tape drives. All subsystem tape drives use cartridge loaders for enhanced performance. See Table 1 on page 32 for more information concerning configuration capabilities.

The details for each callout in Figure 3 are explained in the text that follows.

Note: The Magstar 3590 High Performance Tape Subsystem is not supported in the Magstar 3495 Tape Library Dataserver Model M10.
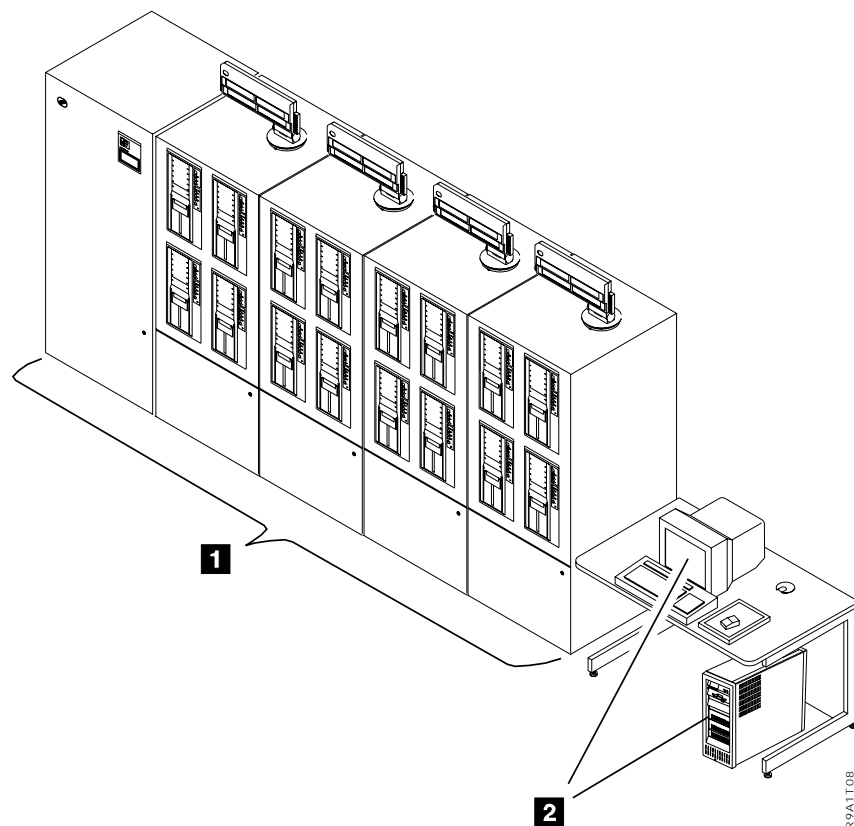
Figure 3. IBM 3495 Tape Library Dataserver—Model M10

Library Manager Application

The library manager (Figure 3, item **2**) is a licensed internal code application installed in the library controller that controls all operations in the tape library. The library manager communicates with the host through 3490/3490E control units equipped with the library attachment feature and allows communication paths for operators and service personnel. The library manager is also used for service and

test sessions and provides control panels and operator status information for the operator's use. Transaction logs and an error log are also provided as problem determination aids.

Commands are processed by the library manager and translated into requests for cartridge or database processing. The library manager database provides a cross-reference between a volume serial number, a volume's actual storage location, and a volume's category. See "Displaying Tape Volume Status" on page 94 for a list of valid volume categories and their descriptions.

Entering a Tape Cartridge into a Tape Library Data Server

To enter tape cartridges into an automated tape library dataserver, place the cartridges into an input station of the library. The following actions occur once the cartridges are placed in the input station:
- The library vision system reads the external label of each cartridge to be entered into the library.
- The library manager notifies all connected systems that there are cartridges to be entered into the tape library dataserver.
- The cartridge entry installation exit (CBRUXENT) is invoked to approve or deny the request to enter the cartridges into the library.
- The volume record in the TCDB is created or updated.

   Note: To force cartridge entry processing to occur on a particular system, use the LIBRARY DISABLE command. For more information concerning this command, see "Disabling Cartridge Entry Installation Exit Processing" on page 78.

Tape cartridges are identified in a VTS at the library manager console through volume serial number ranges. When a 3590 cartridge, identified as a stacked volume, is entered into a library, the volume is recognized as being a VTS managed volume and is not reported to the host as a newly entered volume. Thus, a volume record for the stacked volume is neither created or maintained in the tape configuration database (TCDB). However, the volumes identified at the library manager console as being logical volumes are placed in the insert category and are processed as part of normal cartridge entry. A volume record for the logical volume is created and maintained in the TCDB. If a logical volume fails cartridge entry processing, the logical volume is purged from the library manager database. For information concerning entering logical volumes into a VTS, see "Importing Logical Volumes into a VTS Subsystem" on page 19.

Tape cartridges can be entered into a manual tape library dataserver at the library manager console. The following actions occur when a cartridge is entered into the manual tape library dataserver:
- The library manager notifies all connected systems that there are cartridges to be entered into the tape library dataserver.
- The cartridge entry installation exit (CBRUXENT) is invoked to approve or deny the request to enter the cartridges into the library.
- The volume record in the TCDB is created or updated.

Note: Since the manual tape library dataserver does not have a vision system that reads the external label of each cartridge, the manual tape library dataserver cannot *visually* check the serial number of the volume being put into the library.

Tape cartridges can also be placed into a manual tape library dataserver through the use of the CBRXLCS manual cartridge entry (MCE) programming interface. The following occurs when the manual cartridge entry programming interface is used to put tape cartridges into a MTLDS:

- The cartridge entry installation exit (CBRUXENT) is invoked to approve or deny the entry request.
- A request is sent to the library manager to add the tape volume to the inventory maintained by the library manager. If the request to add the tape volume to the library manager inventory fails, the volume record in the TCDB is not created (if it did not already exist) or is not updated (if it already existed).
- The volume record in the TCDB is created or updated.

For more information on manual cartridge entry (MCE), refer to "Manual Cartridge Entry (MCE)" on page 107.

Importing Logical Volumes into a VTS Subsystem

To introduce logical volumes with data into a VTS library or to reintroduce logical volumes back into a VTS to reuse the volume serial numbers, the volumes must be imported into the library. An import can be performed at the host, with a list of logical volumes to import, or at the library manager, if a single logical volume is to be imported. For more information concerning importing a single logical volume, see "Importing A Single Logical Volume at the Library Manager" on page 21.

An import operation performed at the host begins with the customer or the tape management system writing the list of volumes to be imported into a library on a logical volume in the library. This logical volume then becomes the import list volume. The import list volume indicates:

Import all logical volumes
> The list of volumes written on file sequence one is a list of stacked volumes to be imported into the VTS. All logical volumes residing on the stacked volumes specified are imported.

Import specific logical volumes
> In this case, the list of volumes is a list of stacked and logical volume pairs; each stacked volume is followed by the logical volume to import.

An import option can also be specified along with the volume serial numbers of the stacked and logical volume pairs. If the import option is omitted (blank), the data contents of the logical volume are copied into the VTS subsystem and a data fragment file entry and the library manager record are created. If the option specified indicates "SCRATCH", only the data fragment file entry and the library manager record are created (data contents not copied). If the option specified indicates "INITIALIZE", only a library manager record for the volume is created. If a logical volume serial number is not included with the stacked volume serial number, the import option specified applies to all logical volumes on the stacked volume.

File sequence two is written and later updated by the library manager to record the import status of each requested logical volume. All files must be written in the library specified format. Refer to *MAGSTAR 3494 Tape Library Operator's Guide* for details regarding the library specified format. See "SAMPLIB Member CBRSPSIM" on page 233 and "SAMPLIB Member CBRSPPIM" on page 235 for sample JCL that can be used to write the two required files on the import list volume.

The required stacked volumes containing logical volumes to be imported must be entered into the library prior to initiating the import operation at the library. If the

import operation is initiated before the volumes have been entered and placed in the import category, the import operation immediately fails.

Once the import list volume is written and the stacked volumes are entered into the library, the host needs to notify the library of the logical volume being used for the import operation and to initiate the import operation at the library. The CBRXLCS external services programming interface FUNC=IMPORT or the LIBRARY IMPORT command can be used to initiate the import operation and to identify the import list volume. See "Import Logical Volumes (IMPORT)" on page 108 and "Importing Logical Volumes into a VTS" on page 129 for more information. Only one import operation can be queued or in progress at a time in a physical library. This is a different restriction than for export processing which allows one export operation at a time in each VTS subsystem. Also, if an export operation is already queued or in process, an import operation initiated to the same VTS subsystem as the export operation fails. However, an import operation initiated to a different VTS subsystem is allowed.

When all of the requested logical volumes on a stacked volume have been imported, the library manager places the logical volumes in the insert category to be processed as part of normal cartridge entry processing. There are additional flags that are passed to the cartridge entry installation exit (CBRUXENT) to indicate that the volume is a logical volume and that it has been imported. The logical volume flag is also set for non-imported logical volumes entered into a VTS. This provides a mechanism for the tape management system to track logical volumes.

For the import operation to continue with minimal host delays, it is important for a host that owns the TCDB records for the logical volumes being imported to have the OAM address space available to process the volumes in the insert category. This enables the import category to be processed without delays and allows the library to continue with the next stacked volume.

Note: If an import operation is initiated and no host processes the logical volumes added to the insert category within 60 minutes, the VTS terminates the import operation. This termination is equivalent to a cancel initiated by an operator at the library manager console. See "Canceling an Import Operation" on page 21 for more information.

All attached hosts are notified once the import operation is complete. This enables the import completion status to be reported independently of the status of the host that initiated the import operation. If the attached host has the import list volume in its TCDB, messages are issued with the completion results of the import operation. See "Import Status Messages" on page 21 for more information.

To release the import stacked volumes from the library, the operator can selectively eject the volume or volumes from the library at the library manager. Another operator option is to alter the volume from the import category to the insert category which would allow the stacked volume to be entered into a VTS or a non-VTS library for reuse as a scratch stacked volume or as a physical scratch volume. Before reusing an import stacked volume, make sure that all the logical volumes on the stacked volume either have been successfully imported, or that the data on the logical volumes is no longer needed.

If using DFSMSrmm as your tape management system, use the SEARCHVOLUME subcommand with CONTAINER(*volser*) to verify that no logical volumes are still associated with the stacked volume. This verification should indicate that all logical volumes have been imported. To reuse the volume as a scratch stacked volume,

enter the volume into a VTS library. To reuse the stacked volume as a scratch physical volume, enter the volume into a non-VTS library. The new physical volume will be automatically added to the DFSMSrmm control data set if DFSMSrmm is used. For more information regarding DFSMSrmm commands, refer to *OS/390 DFSMSrmm Guide and Reference*.

Note: When a logical volume is successfully imported, the original exported copy of the logical volume is not altered. Care should be taken not to import this level of data again or changes made to the imported copy will be lost.

Canceling an Import Operation

If needed, the LIBRARY IMPORT,*volser*,CANCEL command or the CBRXLCS external services programming interface FUNC=IMPORT with the cancel option can be used to cancel an executing import operation to expedite other work or to quiesce library activity in preparation for maintenance. A cancel from the host is normally effective immediately, except for the period of time when host insert processing is occurring for logical volumes that are being imported from a stacked volume. In this case, the host cancel takes effect after host insert processing is completed. The host cancellation method is the preferred method for canceling an import operation. However, in addition to the host cancellation methods, an import operation can also be explicitly canceled at the library manager, if there is no host available to cancel the import operation. Differences in the cancel methods will occur during host insert processing. If the explicit cancel occurs during host insert processing, the import operation terminates and logical volumes that are still assigned to the insert category are left in the insert category to be processed by the host when it is available.

The status of all logical volumes requested for import is found in the status file of the import list volume after the import operation completion. Exported stacked volumes that were provided for import and were completed prior to the cancel are not affected by the cancel.

Import Status Messages

As the library is processing an import operation, status messages are reported to all attached hosts. This results in OAM issuing message CBR3750I. Status messages are issued at the following key processing points:

- When import processing begins for a stacked volume
- When the library completes importing the requested logical volumes on a stacked volume (i.e., the volumes are in the insert category to be processed by the host)
- When the import processing is complete for a stacked volume (i.e., all of the requested logical volumes on the stacked volume have been processed by OAM)
- When processing completes for the import operation

The library may also issue message CBR3750I if an error occurs during the import operation that temporarily or permanently stops the operation.

Importing A Single Logical Volume at the Library Manager

There may be instances in which an exported logical volume is needed during job processing and the logical volume has not previously been imported. To expedite this process, the library allows an operator to initiate a single volume import operation at the library manager. The operator enters the stacked volume containing the logical volume to import and indicates which logical volume is being imported. This eliminates the need for the host to write the logical list volume discussed in "Importing Logical Volumes into a VTS Subsystem" on page 19.

To further assist in this process, when a logical volume is exported from the library, the volume record in the TCDB is updated with a shelf location of STACKED=*volser* (if the TCDB record is retained and the shelf location is blank). The volume not in library installation exit sample program, CBRSPUXV, also recognizes a shelf location of STACKED=*volser* and displays the stacked volume. This allows the operator to identify the specific stacked volume on which the requested logical volume resides. If an installation is not using this default support, nor DFSMSrmm, custom modifications to the volume not in library installation exit will need to be made.

The sample volume not in library exit supplied by DFSMSrmm also takes into account whether an exported logical volume is being requested and will display the stacked volume on which the logical volume resides.

As with a host initiated import operation, when the single volume import operation is complete, all hosts attached to the VTS subsystem that performed the operation will be notified of this completion. Only one import operation, host or library initiated, is allowed per physical library.

Checking the Volume Serial Number for Uniqueness

When entering tape cartridges into a tape library, OAM checks each volume serial number in the insert category for uniqueness (see "Volume Serial Number Restrictions" on page 25). If there is already an SMS-managed DASD or optical volume with the same volume serial number as the tape volume being entered, the cartridge entry is rejected. Also, if the media type of the volume being entered does not match the media type of the volume in the TCDB, cartridge entry is rejected. For cartridge entry processing into a manual tape library dataserver through the use of the MCE general-use interface, only DASD volumes are checked for uniqueness.

If OAM determines that the volume serial number is unique, it obtains the tape volume record from the TCDB. Depending on whether or not a record is found, several different actions can occur:
- Tape volume record is not present (for a newly entered cartridge, normal cartridge entry occurs).
- Tape volume record indicates the volume is in another library (treated as an error if the volume has not been reentered, and cartridge entry is denied).
- Tape volume record indicates volume is in this library (proceed with cartridge entry).
- Tape volume record indicates volume shelf-resident (normal cartridge reentry).

Before the volume record is created or updated, the cartridge entry installation exit (CBRUXENT) is called to set or verify values for many of the record fields. See "Cartridge Entry Installation Exit (CBRUXENT)" on page 156 for a list of fields.

Note: When volumes are entered into an MTLDS, a cell location is assigned. If the cartridges are entered through the CBRXLCS FUNC=MCE programming interface, the cell location assigned by the library manager is the external volume serial number. If the cartridges are entered into the MTLDS at the library manager, the default is the external volume serial number; however, this value can be set to a different value determined by the installation's storage management policy.

Using Global Resource Serialization with Cartridge Entry Processing

Cartridge entry processing is normally serialized, that is, one system performs cartridge entry for the entire SMS complex. This is accomplished by sending one or

more SYSTEMS level enqueues around a global resource serialization ring. For DFSMS/MVS V1R3, the resource names are:

```
QNAME-SYSCBR
RNAME-CARTRIDGE_ENTRY_libname
```

With DFSMS/MVS V1R4 and above, a second enqueue is also obtained to preserve the already existing serialization that is in place with DFSMS/MVS V1R3. This additional serialization eliminates the need for toleration support at the lower release levels and sets in place an authorized enqueue. The resource names are:

```
QNAME—SYSZCBR
RNAME—CARTRIDGE_ENTRY_libname
```

When DFSMS/MVS V1R3 is no longer supported, the first enqueue using SYSCBR will be eliminated.

Note: OAM already sends a SYSTEMS level enqueue around the global resource serialization ring, so there is no need to include the QNAME or RNAME in the SYSTEM inclusion RNL. The QNAME and RNAME are provided for documentation purposes.

It is possible to perform cartridge entry processing without the global resource serialization ring. The consequences of unserialized processing are as follows:

1. Cartridge entry occurs concurrently in all processors. Each processor handles a subset of the entered volumes.
2. Some additional processing overhead takes place, due to concurrent processing of the same list of volumes.
3. The cartridge entry installation exit is entered once for each volume on each processor. The installation must account for this possibility when writing the exit.

The use of the global resource serialization ring is recommended.

Note: The global resource serialization ring (GRS) discussion does not pertain to cartridge entry processing through the MCE general-use programming interface.

Tape Volume Requirements

The ATLDS and the MTLDS support the use of the IBM Cartridge System Tape or its American National Standards Institute (ANSI) equivalent. Both IBM Cartridge System Tape (MEDIA1) and IBM Enhanced Capacity Cartridge System Tape (MEDIA2) are supported. The IBM High Performance Cartridge Tape (MEDIA3) and the IBM Extended High Performance Cartridge Tape (MEDIA4) are only supported in the ATLDS. Each volume is identified by a unique volume serial number.

The following requirements are enforced for cartridge system tape volumes:
- All physical volumes residing in an ATLDS must have a supported external barcode label readable by the automated tape library dataserver vision system unless the unlabeled tape facility at the library manager is being used.
- All volumes residing in a MTLDS should also have a supported machine readable external label to be compatible with the ATLDS.
- All private volumes must have either an internal IBM standard tape label or an International Organization for Standardization American National Standards Institute (ISO/ANSI) label, unless bypass label processing (BLP) or nonlabeled tape (NL) is specified.
- All private volumes must have identical internal and external volume serial numbers, unless BLP or NL is specified. The internal volume serial number is recorded in the tape volume label (VOL1 label).
- BLP or NL may be requested for input processing on specific volume serial references. It may also be requested for output processing on specific or nonspecific references, but only in an automated tape library dataserver.
- All volume serial numbers in the same SMS complex must be unique across tape, DASD, and optical environments.
- A scratch volume cannot be requested using a specific volume serial number.
- All volumes of a multivolume data set should reside in the same library, or all should reside outside a library; however, if they do not, the installation will be given the chance to enter the volumes through the volume not in library installation exit (CBRUXVNL).
- All volumes of a multivolume data set must belong to the same tape storage group.
- All volumes of a multivolume data set must be recorded using the same tape recording technology.
- Volumes of a multivolume data set may be an intermix of media types supporting the same recording technology.

Accessing the Tape Volumes

Because tape volumes can reside either inside libraries or on shelves outside the library, physical procedures for accessing volumes vary according to their location:
- When a library-resident volume is requested, the system mounts it on a tape drive in the tape library containing the volume.
- When a shelf-resident volume is requested, the installation is given the opportunity to enter the volume into a tape library by using the volume not in library installation exit. If the volume is not entered into the library, the system requests the volume be mounted on a nonlibrary device (stand-alone tape drive).

> **Note:** Shelf storage may be local to the computer facility and, therefore, accessible to the operator, or it may be located at another location.

Volume Serial Number Restrictions

When a physical tape volume is entered into an ATLDS or MTLDS, the cartridge must have an external label (readable by machine, human, or both). If the volume is assigned the private use attribute on entry into the tape library dataserver, a magnetically recorded volume serial number on the tape volume label must be present and match the volume serial number on the external label. This label is not checked on entry into the tape library dataserver, so if there is an error, it is not detected until the volume has been mounted and the label has been read. If the volume is assigned the scratch use attribute and no volume serial number exists for it, a new volume label with a matching volume serial number is written whenever the data set is opened for output on the tape. For a scratch volume with an existing volume serial number that does not match the volume serial number on the external label, the internal label is rewritten to match the external label. In the case of an

MTLDS scratch volume, the process is not automated. Either the operator is prompted for the volume serial number (volser) when the volume is first mounted for output, or the IEHINITT utility (or RMM equivalent EDGINERS) can be used to prelabel the scratch cartridge.

Ejecting a Tape Cartridge from a Tape Library Dataserver

Ejecting a cartridge from a tape library dataserver breaks the connection between the cartridge and the library in which it resided. This may be required for various reasons, for example the storage capacity of the library (as determined by the installation's tape management system) may be reached and cartridges must be ejected to maintain thresholds. Cartridges may need to be moved to a different location and must therefore be ejected from the library in which they currently reside so they may be put into a library at the new location. Once the cartridges are ejected from the library in which they reside, they are no longer associated with that library and are not eligible to be mounted in the library without going through the cartridge entry process.

There is currently a limit on the number of eject requests that device services can have queued across all libraries from a single system. This queue limit is currently set at 1600. For this limit to be as transparent as possible, OAM will not send more than 100 eject requests to a single library from a single system. If OAM receives more than 100 eject requests for a given library, it will wait until an eject request completes before sending another request to that library. However, if the OAM address space is stopped or restarted with an SCDS activation, rather than purging the remaining eject requests, OAM will try and send down as many of the remaining eject requests as it can before reaching the device services queue limit of 1600. Additionally, there is a Peer-to-Peer VTS Subsystem limitation. This library will only accept up to 1000 eject requests across all connected systems. Given these limitations (and potential storage constraints when processing thousands of outstanding eject requests), we recommend that you limit the number of outstanding eject requests at any given time to no more than a couple thousand per system. Then, as the outstanding eject requests complete, more can be initiated.

Cartridges can be ejected from a tape library in the following ways:
- OAM can eject the tape cartridge automatically following an unsuccessful cartridge entry attempt.
- An operator can eject the tape cartridge using the MVS LIBRARY EJECT command. See "Ejecting a Specific Tape Volume" on page 74 for more information concerning this command.
- A storage administrator can specify an EJECT line operator next to a volume serial number on an ISMF Mountable Tape Volume List panel. See "Ejecting a Volume from a Tape Library" on page 283 for more information.
- An application program can issue the CBRXLCS macro with the EJECT function. For more information on this macro and its functions, see "Chapter 6. LCS External Services" on page 107.

Before a cartridge can be ejected from a tape library, the cartridge eject installation exit (CBRUXEJC) is invoked to approve or deny the eject request. See "Cartridge Eject Installation Exit (CBRUXEJC)" on page 164 for more information.

Note: Manually removing volumes from a library for the purpose of ejecting them is not supported. The volumes which are manually ejected from a library are still library-resident in the TCDB causing an out of synchronization condition with the library manager database. Volumes must be ejected following the methods above.

When a tape volume residing in a manual tape library dataserver is ejected, no automated movement of the cartridge takes place. It is up to the operator to physically remove the tape cartridge from the storage racks associated with the manual tape library dataserver and to confirm the eject request at the library manager console.

After the eject request completes, the invoker of the eject request is notified of its success or failure and the volume record in the TCDB is updated or deleted.

Note: For information concerning exporting or removing a logical tape volume from a VTS, see "Exporting Logical Volumes from a VTS Subsystem" and "Ejecting a Logical Volume from a VTS".

Ejecting a Logical Volume from a VTS

If a logical volume is in a fast ready category at the VTS, it can be ejected (purged) from the library using the methods described in "Ejecting a Tape Cartridge from a Tape Library Dataserver" on page 26. An export operation for the purpose of deleting a logical scratch volume is not required. If a logical volume is in the insert category, it can also be ejected (purged) using the same methods after a TCDB record is manually created or updated indicating that the volume resides in the library. For information concerning an export operation, see "Exporting Logical Volumes from a VTS Subsystem".

Exporting Logical Volumes from a VTS Subsystem

To remove a set of logical volumes from a VTS, the operator or the tape management system should first run a vaulting-type operation at the host to determine the list of logical volumes to be exported. This list is then written in volume serial number and destination pairs as the first file on an available logical volume. This volume then becomes the export list volume. This export list volume must reside in the library where the volumes to be exported reside and it must be written in a library specified format. Two more files are also written on this export list volume. File sequence two is a file reserved for future use. File sequence three is written and later updated by the VTS to record the export status of each logical volume listed in the export list. All three files must be written in the library specified format. Refer to *MAGSTAR 3494 Tape Library Operator's Guide* for details regarding the library specified format. See "SAMPLIB Member CBRSPSXP" on page 238 and "SAMPLIB Member CBRSPPXP" on page 241 for sample JCL that can be used to write the three required files on the export list volume. The DFSMSrmm SEARCHVOLUME command with the CLIST option can be used to create this export list. For more information on this command, refer to *OS/390 DFSMSrmm Command Reference Summary*.

Once the export list volume is written, the LIBRARY EXPORT command or the CBRXLCS external programming interface FUNC=EXPORT can be used to identify the export list volume and to initiate the export operation at the library. For more information, see "Export Logical Volumes (EXPORT)" on page 108 and "Exporting Logical Volumes from a VTS" on page 127. Only one export operation can be queued or in progress at a time in each virtual tape server subsystem. Also, if an import is currently queued or in progress, an export operation cannot be initiated to the same virtual tape server subsystem.

The library then mounts the export list volume and determines the list of volumes to export and the destination or destinations for the logical volumes. Logical volumes with the same destination will be grouped together on the same stacked media. This lets a single export operation cover multiple destination sites. The library then

begins writing the export logicals on stacked volumes. On the third file of the export
list volume, the library records the status of each logical volume being exported; this
can be referred to as the export status file. If a volume cannot be exported because
it is currently in use or does not exist in the library, the export status file indicates
the error that occurred as well as reflects the successful export of each logical
volume. Each exported stacked volume contains a volume map identifying the
contents of the stacked volume, logical volume data fragment files for each logical
volume successfully copied, and the logical volumes themselves. A single export
operation may result in many stacked volumes being exported with multiple
volumes per destination.

As the library manager finishes with a stacked volume, the logical volumes are
assigned to the exported category. The volumes in this category are then processed
by OAM. Volume export processing is similar to eject processing; however, in
addition, the cartridge eject installation exit (CBRUXEJC) is passed the container
volume serial number of the stacked cartridge on which the logical volume resides.
This is information that the tape management system will want to record. The tape
management system's acceptance of the eject is implicit (there is no opportunity to
fail the eject). However, in an environment where a common TCDB is shared by
more than one tape management system and each tape management system has
its own database, the tape management system can return UXJIGNOR, Return
Code 12, to allow another tape management system who "owns" the exported
volume to process. If UXJIGNOR is returned from the CBRUXEJC installation exit,
the logical volume remains in the exported category; otherwise, each logical volume
is then purged from the library manager inventory and the host TCDB volume
record is kept or purged, depending on the disposition specified by the installation
exit or defaults set for the library when it was defined using ISMF.

Once all logical volumes residing on a stacked cartridge have been successfully
purged from the library manager inventory, the export operation continues at the
library, filling another stacked volume for the destination currently being processed.
The completed stacked cartridge can then be released by an operator at the library
manager either on an individual completion basis, or after a set of volumes has
been processed. For the export operation to continue with minimal host delays, it is
important for a host that owns the TCDB records for the logical volumes being
exported to have the OAM address space available to process the volumes in the
exported category. This enables the exported category to be processed without
delays and allows the library to continue with the next stacked volume.

Note: If an export operation is initiated and no host processes the exported
category within 60 minutes, the VTS terminates the export operation. This
termination is equivalent to a cancel initiated by an operator at the library
manager console. See "Canceling an Export Operation" for more information.

Once the export operation is complete, all hosts attached to the VTS subsystem
that performed the operation are notified of this completion. This enables export
completion status to be reported independently of the status of the host that
initiated the export operation. If the attached host has the export list volume in its
TCDB, messages are issued with the completion results of the export operation.
Status messages are also issued at key processing points throughout the export
operation. See "Export Status Messages" on page 29 for more information.

Canceling an Export Operation
Because an extensive list of export volume candidates could take considerable time
to complete, it may be necessary to cancel an export operation to expedite other
processing or to quiesce the library activity in preparation for maintenance. The

LIBRARY EXPORT,*volser*,CANCEL command or the CBRXLCS external services programming interface FUNC=EXPORT with the cancel option can be used for this purpose. A cancel from the host is normally effective immediately, except for the period of time when host purge processing is occurring for logical volumes being exported to the exported stacked volume. In this case, the host cancel takes effect after host purge processing is completed for the exported stacked volume.

The host cancellation method is the preferred method for cancelling an export operation. However, in addition to host cancellation methods, an export operation can also be explicitly cancelled at the library manager if there is no host available to cancel the export operation. Differences in the cancel methods will occur during host purge processing. If the explicit cancel occurs during host purge processing, the export operation terminates and logical volumes in the exported category are placed in the insert category (none of these logical volumes will be exported) and the host will perform insert processing on these logical volumes when it is available. The exported stacked volume will go back into the pool of usable scratch stacked volumes.

The status of all logical volumes requested for export is found in the status file of the export list volume after the export operation completes. Exported stacked volumes that were completed and placed in the export hold category prior to the cancel are not affected by the cancel.

Export Status Messages

As the library is processing an export operation, status messages are reported to all attached hosts. This results in OAM issuing operator message CBR3750I. Status messages are issued at the following key processing points:

- When export processing begins for a particular destination
- When the library completes a stacked volume and the logical volumes are in the exported category and ready for host processing
- When the library completes a stacked volume and it is ready to be released (ejected) by an operator
- When processing completes for a particular destination
- When processing completes for the export operation

The library may also issue message CBR3750I if an error occurs during the export operation that temporarily or permanently stops the export operation.

Using Global Resource Serialization with Export Processing

To prevent multiple hosts from attempting to simultaneously process logical volumes in the export category, a SYSTEMS level enqueue, similar to cartridge entry processing, is used. The resource names are:

```
QNAME—SYSZCBR
RNAME—EXPORTED_CATEGORY_libname
```

It is possible to perform export processing without the global resource serialization ring. The following are consequences of unserialized processing:

1. Export completion processing occurs simultaneously in all processors. Each processor handles a subset of the exported volumes.
2. Some additional processing overhead takes place, due to concurrent processing of the same list of volumes.
3. The cartridge eject installation exit is entered once for each volume on each processor. The installation must account for this possibility when writing the exit.

Due to these consequences, the use of the global resource serialization ring is recommended.

Chapter 2. Planning for the Tape Library Support

In many ways, planning is the most important phase of a product's implementation and administration cycle. Time spent in planning is fully repaid in time, effort, and money saved by a well-implemented installation and a smooth transition to full system integration. This chapter identifies key areas that must be addressed during the planning stage for tape library support, as well as installation procedures to follow when you are ready to install OAM. Rather than repeat large amounts of information available elsewhere, this chapter focuses specifically on issues related to tape library dataservers and provides references to other resources.

Analyzing Your Processing Environment

Installing a new product is rarely an isolated event. Planners must evaluate how the environment is affected by the new product, as well as how to customize the new product to integrate it with the existing components. This section presents hardware and media requirements and considerations.

Hardware

Drive types supported in an ATLDS or an MTLDS:

3490   Sometimes referred to as a base 3490. It is identified on JCL statements as UNIT=3480X. Supported in 3495 ATLDS, and 3495 MTLDS.

3490E It is identified on JCL statements as UNIT=3490. Supported in the 3495 and 3494 ATLDS and 3495 MTLDS.

3590-1

It is identified on JCL statements as UNIT=3590-1. Supported in the 3495 and 3494 ATLDS as a 3590 Model B Tape Subsystem.

3590-E

It is identified on JCL statements as UNIT=3590-1 or UNIT=3490. Supported in the 3494 ATLDS, in 3590-1 emulation mode only, as a 3590 Model E Tape Subsystem.

Notes:
1. The 3495 ATLDS can only be configured with 3490, 3490E, and 3590 Model B tape subsystems.
2. The 3495 MTLDS can only be configured with 3490 and 3490E tape subsystems.
3. The 3494 ATLDS can only be configured with 3490E, 3590 Model B, and 3590 Model E tape subsystems.

The hardware configurations described in Table 1 on page 32 can be used separately or in specific combinations to create or modify your tape storage environment.

Table 1. Tape Storage Configurations

Library Model	Subsystem Device Type	Library Attachment	Media Supported		Recording Technology	Noncompacted Data Capacity
3495 L20, L30, L40, L50	3490	Yes	MEDIA1	(R/W)	18	200MB
	3490E	Yes	MEDIA1 MEDIA1/2	(R) (R/W)	18 36	200MB 400MB, 800MB
	3590-1*	Yes	MEDIA3/4	(R/W)	128	10GB, 20GB
3494 L10	3490E	Yes	MEDIA1 MEDIA1/2	(R) (R/W)	18 36	200MB 400MB, 800MB
	3590-1*	Yes	MEDIA3/4	(R/W)	128	10GB, 20GB
	3590-E** (3590-1 emulation)	Yes	MEDIA3/4 MEDIA3/4	(R) (R/W)	128 256	10GB, 20GB 20GB, 40GB
3495 M10	3490	Yes	MEDIA1	(R/W)	18	200MB
	3490E	Yes	MEDIA1 MEDIA1/2	(R) (R/W)	18 36	200MB 400MB, 800MB
STAND ALONE	3480	N/A	MEDIA1	(R/W)	18	200MB
	3490	N/A	MEDIA1	(R/W)	18	200MB
	3490E	N/A	MEDIA1 MEDIA1/2	(R) (R/W)	18 36	200MB 400MB, 800MB
	3590-1*	N/A	MEDIA3/4	(R/W)	128	10GB, 20GB
	3590-E** (3490E emulation)	N/A	MEDIA3/4 MEDIA3/4	(R) (R/W)	128 256	10GB, 20GB 20GB, 40GB
	3590-E** (3590-1 emulation)	N/A	MEDIA3/4 MEDIA3/4	(R) (R/W)	128 256	10GB, 20GB 20GB, 40GB

Table 1. Tape Storage Configurations (continued)

Library Model	Subsystem Device Type	Library Attachment	Media Supported	Recording Technology	Noncompacted Data Capacity
Note: MB = 1 048 576 bytes GB = 1 073 741 824 bytes (R) = Read only (R/W) = Read and write MEDIA1 = IBM Cartridge System Tape MEDIA2 = IBM Enhanced Capacity Cartridge System Tape MEDIA3 = IBM High Performance Cartridge Tape MEDIA4 = IBM Extended High Performance Cartridge Tape *3590-1 is used to represent the 3590 Model B Tape Subsystem and is a system defined esoteric. **3590-E is used to represent the 3590 Model E Tape Subsystem and is not a system defined esoteric. It is supported in a library as a 3590 Model E tape subsystem rather than what it is emulating. For information concerning cartridge storage feature options and cartridge capacities for these tape devices, refer to *3494 Tape Library Dataserver Introduction and Planning Guide*, *3480 Magnetic Tape Planning and Migration Guide*, *3490 Models A01, A02, A10, A20, B02, B04, B20, and B40 Introduction*, *3490 Planning and Migration Guide*, and *3590 Introduction and Planning Guide*. The library models indicated can be configured with any combination of correlating tape subsystem devices. These configurations may vary in the number of drives, slots, and media type supported in the libraries. OAM is not aware of the type and number of channel attachments used to connect the supported Magnetic Tape Subsystems to the ESA/370 or ESA/390® processor. Any number and type (serial or parallel) of channel attachments supported by these subsystem configurations and the processor to which they are attached may be used.					

Managing Multiple Media Formats

Your planning strategy must include consideration of multiple media formats and a choice of cartridge system tapes. The TCDB provides the tape device selection information (TDSI) that determines the data class attributes assigned to a volume. Depending on the IBM subsystems, and available features, and interchange requirements between stand-alone and library-resident tape drives, multimedia considerations should include:

- Should compaction be used?
- Does the tape subsystem write in 18-track, 36-track, 128-track, or 256-track format?
- Does the tape subsystem use IBM Cartridge System Tape, IBM Enhanced Capacity Cartridge System Tape, IBM High Performance Cartridge Tape, or IBM Extended High Performance Cartridge Tape?

Compaction Considerations: Compacting data may increase effective storage capacity. The 3490E subsystem uses the improved data recording capability (IDRC) as the default mode. IDRC is a standard feature on the 3490 subsystems. The 3590 subsystem uses an improved compaction algorithm to increase effective cartridge data capacity.

18-Track, 36-Track, 128-Track and 256-Track Considerations: The 3490 subsystem writes data in the 18-track format. Data written in the 18-track format can be retrieved or read by the 3490E. All 3490E subsystems write data in the 36-track format, which doubles the storage capacity of a tape cartridge. The 3590 Model B Tape Subsystems write data in the 128-track format and the 3590 Model E Tape Subsystems write data in the 256-track format.

Note: Data written on the 3490E subsystem cannot be read by either a 3480, 3490, or 3590 subsystem. Data written on a 3590 Model E Tape Subsystem is incompatible with any other tape subsystem; however, data written on a 3590 Model B Tape Subsystem can be read on a 3590 Model E Tape Subsystem.

Tape capacity considerations: It is important to keep in mind the capacities of the tape cartridges you are using within the tape library to allow the most efficient use of the storage space available. Table 1 on page 32 depicts the capacity differences between the tape cartridge types.

Tape Device Selection Information

The device selection attributes of a tape volume are recorded in the tape device selection information (TDSI) fields of the tape volume record. The TDSI fields are set when a cartridge is entered into a library. The installation should provide a cartridge entry installation exit to assist in the process of setting the TDSI fields. See "Cartridge Entry Installation Exit (CBRUXENT)" on page 156 for more information concerning this cartridge entry installation exit. See "TDSI Toleration Considerations" on page 46 for more information on TDSI. The following TDSI is assigned to the tape volume:

- Recording technique—specified as unknown, 18-track, 36-track, 128-track, or 256-track
- Media type—specified as unknown, MEDIA1, MEDIA2, MEDIA3, or MEDIA4
- Compaction—specified as unknown, none, or compacted
- Special attribute—may be set to none or read-compatible

3490 Read-compatibility processing allows a MEDIA1 cartridge written on a base 3490 device using 18-track recording technique to be mounted and read on a 3490E device. Data originally written to a volume using a base 3490 can be *over-written* using a 3490E device as long as the recording starts at the load point of the volume. However, using a 3490E device to write *additional* data starting in the middle of a volume originally written by a base 3490 is not permitted, since this *intermixes* the 18-track and 36-track recording techniques on the same volume.

In a nonlibrary environment, the allocation process provides two system-defined esoteric unit names—SYS3480R and SYS348XR — that allow the installation to specify that the volume is used for read-only purposes so that 3490E drives become eligible for allocation.

3590 Read-compatibility processing allows a MEDIA3 or MEDIA4 cartridge written on a 3590 Model B Tape Subsystem using the 128-track recording technique to be mounted and read on a 3590 Model E Tape Subsystem. Data originally written to a volume using a 3590 Model B drive can be over-written using a 3590 Model E device as long as the recording starts at the load point of the volume. However, using the 3590 Model E device to write additional data starting in the middle of a volume originally written by a 3590 Model B device is not permitted, since this intermixes the 128-track and 256-track recording techniques on the same volume.

In a nonlibrary environment, there are no equivalent 3590 system-defined esoteric unit names.

For a request for an SMS-managed volume, the JCL UNIT specification is ignored, so read-compatibility must be handled in a different manner. There is a special attribute field included in the TDSI that can be set to read-compatible, allowing 3490E drives to become eligible to handle requests for 18-track recorded volumes

and 3590 Model E drives to become eligible to handle 128-track recorded volumes. Your installation is responsible to set the read-compatible special attribute in either of the following manners:

- Using the cartridge entry installation exit (CBRUXENT).
- Using the access method services ALTER VOLUMEENTRY service. (For more information on access method services, refer to *OS/390 DFSMS Access Method Services for Catalogs*.)

Once the attribute is set, it remains set until the volume is returned to scratch. To request read-compatibility for a single usage of the volume, you can specify *LABEL=(,,,IN)* on the DD statement of your JCL.

Software Volume Categories

Figure 4 identifies the software categories used in support of the ATLDS and the MTLDS. Refer to "TCDB Volume Error Status Field and Software Error Category" for a discussion of the software error category.

CATEGORY (in HEX)	NAME	DEFINITION
0001	MEDIA1	Cartridge system tape common scratch pool*
0002	MEDIA2	Enhanced capacity cartridge system tape common scratch pool*
0003	MEDIA3	High performance cartridge tape common scratch pool
0004	MEDIA4	Extended high performance cartridge tape common scratch pool
000E	ERROR CATEGORY	Scratch volumes for which the software detected an error during processing
000F	PRIVATE CATEGORY	Specific volume category
Note:		
If the tape library is partitioned, the categories used are derived from the base software categories. See "Partitioning Tape Libraries among Multiple Sysplexes" on page 40 for more information concerning partitioning support.		
*Cartridge System Tape (MEDIA1) or Enhanced Capacity Cartridge System Tape (MEDIA2) are the only media types supported in the MTLDS.		

Figure 4. Software Volume Categories

Also, in an MTLDS, to assist the operator in nonspecific mount requests or in loading the cartridge loaders, each scratch category can be assigned a 10-character alias at the library manager console. When a category mount order is received, instead of displaying the hex category on the 3490 message display and at the library manager console, the library manager displays the alias. For example, when a category mount is received for a cartridge system tape, "MEDIA1" or "GRAY" can be substituted.

TCDB Volume Error Status Field and Software Error Category

When a hardware or software error is detected, the volume error status field in the tape configuration database (TCDB) is updated to reflect the error, and the volume may also be placed in the software error category in the library manager database.

More specifically, when a software error is detected for a scratch volume, this results in the volume being placed in the software error category in the library manager database. See "Software Volume Categories" on page 35 for more information on the software volume category. The setting of an error category prevents the volume from being selected for future nonspecific (scratch) mount requests. In addition, the error status field in the TCDB volume record is updated to reflect the software error condition.

Detecting Software Errors for Private Volumes

A software error detected for a private volume results in an update to the volume record in the TCDB with the appropriate error status; however, since private volumes are requested by volser and not by a category value, there is no need to place private volumes in the software error category.

Detecting Hardware Errors for Volumes

When a hardware error is detected (for either scratch or private volumes), the error is tracked in the library manager database and in the TCDB. Since the library manager tracks hardware-related errors for volumes, there is no need to place the volume in the software error category.

Resetting the Volume Error Status Field

There are several ways to reset the volume error status field in the TCDB and, if applicable, move the volume out of the software error category:

- General-use-programming-interface CBRXLCS FUNC(CUA) can be used to change the volume's use attribute from SCRATCH to PRIVATE, PRIVATE to SCRATCH, PRIVATE to PRIVATE, or SCRATCH to SCRATCH. See "Change Use Attribute (CUA)" on page 107 for more information on how use this interface. If the only purpose of the CBRXLCS invocation is to reset the volume error status field, CBRXLCS FUNC(CUA) from SCRATCH to SCRATCH or PRIVATE to PRIVATE accomplishes this (it is not necessary to actually change the volume's use attribute). Invoking CBRXLCS FUNC(CUA) will also move a volume out of the software error category.

- The ISMF volume ALTER command or line operator can be used to update specific fields in the TCDB volume record, including the volume error status field. If no other changes to the volume are required, invoke ISMF ALTER to change the volume's use attribute from PRIVATE to PRIVATE or SCRATCH to SCRATCH. Changing the volume's use attribute from SCRATCH to PRIVATE or from PRIVATE to SCRATCH using ISMF ALTER also resets the volume's error status field. Invoking ISMF ALTER against a volume record also moves a volume out of the software error category.

- If a volume is ejected from the library where it resides and is reentered into the same library, or a different library, the volume error status field and software error category resets upon entry.

- A successful audit of a volume resets a hardware error in the TCDB (such as misplaced volumes), but it does not clear a software error in the TCDB. Since hardware errors do not result in the volume's category being changed, audit never alters the setting of a volume in the error category. If a scratch volume has a software error associated with it, a successful audit of the volume leaves the volume error condition set in the TCDB and leaves the volume in the error category.

  Note: Also keep in mind that resetting a hardware error condition in the volume's TCDB volume record does not clear the condition in the library manager database.

Displaying Scratch Volume Counts

Whenever you use the DISPLAY SMS,LIBRARY command, the scratch volume counts that are displayed reflect the number of scratch volumes in the scratch media categories. If a scratch volume is in the software error category, it is not included in this count because it is not considered a usable scratch cartridge.

Displaying Software Error Category Count

Use the DISPLAY SMS,LIBRARY to display the number of scratch volumes currently in the software error category associated with a particular library. See "Displaying Library Detail Status" on page 86 for more information on this command.

TCDB Volume Expiration Date

When an expiration date is specified when writing a dataset, the volume's expiration date is recorded in the TCDB Volume Expiration Date field. If an expiration date pre-exists for the volume, the later date becomes the new expiration date. If the pre-existing date is later than the new date, the pre-existing date is retained. However, if special "never expire" dates 99365 or 99366 are involved, these special dates take precedence. Special "never expire" dates appear in ISO format as 1999/12/31 for 99365, and 1999/12/32 or 1999/13/01 for 99366.

Console Name Message Routing

Through console name message routing support, an MVS console can be associated with each tape library. Instead of routing library specific messages to all consoles associated with the messages' routing codes, they are routed to a specific library console.

For critical messages that need to be broadcast to a wider audience, the messages will be issued to the library console and to the MVS consoles associated with the routing codes. For example:

```
CBR3758E  Library library-name operation degraded.
```

Associating Console Names with Tape Libraries

When the storage administrator defines a tape library using the ISMF Tape Library Define panel, an MVS console name can be associated with the tape library. The console name is stored in the library record in the TCDB. The console name is also passed to the following installation exits:
- Cartridge Entry Installation Exit (CBRUXENT)
- Cartridge Eject Installation Exit (CBRUXEJC)
- Change Use Attribute Installation Exit (CBRUXCUA)
- Volume Not in Library Installation Exit (CBRUXVNL)

The console name specified on the ISMF Tape Library Define panel must also be defined in the CONSOLxx member of PARMLIB for each system connected to the library.

Defining an Alternate MVS/ESA™ Operating System MCS Console

You can define an alternate MVS/ESA operating system MCS console using an active 3270 session on the library manager machine console. You may want to have an active MVS MCS console on the same machine running the library manager; this allows the person managing the library manager console to perform the following tasks:
- Display and change the status of the tape library and its associated tape drives
- Display the host status of a tape volume within the tape library
- Display or change the status of an SMS TAPE storage group
- Receive library specific MVS messages

Taking Advantage of Console Name Message Routing

To take advantage of console name message routing, the installation must configure each sysplex sharing the library in one of the following ways:

- In a JES3 environment, the console name associated with the library must be attached to the current JES3 global processor, and must be switchable to any local processor capable of becoming the global. The console should be defined in the JES3 initialization deck as an MCS console by specifying TYPE=MCS and using the UNIT keyword on the CONSOLE statement (not the DEVICE statement) to establish the logical association to the actual device number on the individual processors.

- In a cross system communication facility (XCF), define a physical console to receive tape library-specific messages. Make sure each system in the sysplex has that console defined with the same name. A separate console can be used per library.

- In a JES2 environment without XCF, each system must have a separate physical console, and all consoles must have the same name.

If more than one sysplex shares the library, each sysplex must have a separate physical console. If there is a single TCDB, then all consoles must have the same name. If there is a separate TCDB for each sysplex, then each sysplex may have a unique console name.

Sharing a Tape Library Among Multiple Systems

The ATLDS and the MTLDS may be shared among multiple systems and, in some cases, among multiple SMS complexes. In all cases, it is the responsibility of the installation to ensure that an individual library-resident tape drive not be allocated by two systems concurrently. This means that the tape drive can be online to only one SMS complex. In addition, if the SMS complex where the tape drive is online does not have JES3 or equivalent support for the sharing of tape drives, the tape drive can be online to only one system. To ensure that volumes intended for VM use are not made available to SMS, the installation should assign a recognizable volume serial number range to VM and a different range to SMS. The cartridge entry installation exit, through use of the *ignore* return code, prevents SMS from using the wrong set of volumes. See Figure 5 on page 39 for an example of sharing a tape library among systems.

One SMSplex and One TCDB. All Systems Access Both Libraries.
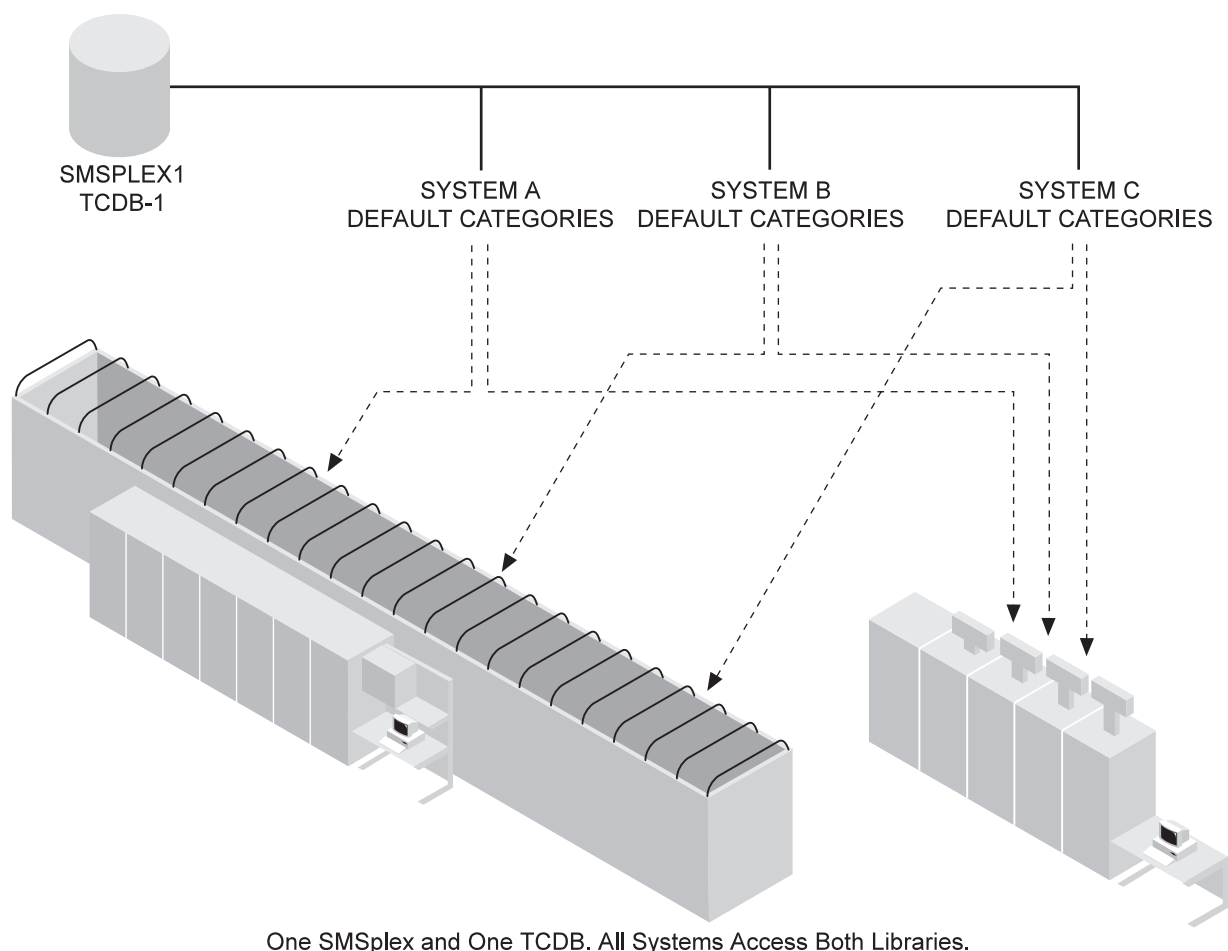
Figure 5. Sharing a Tape Library among Multiple Systems

The ATLDS and the MTLDS can also be shared among multiple SMS complexes, provided the following restrictions are observed:

- There must be a single shared tape configuration database among all systems in all SMS complexes. This means there is one general volume catalog, and at the most one specific volume catalog for each valid initial volser character.

- The library name associated with the hardware library ID must be the same in each SCDS. The library console name and the scratch volume message thresholds must also be the same. The entry default data class, entry default use attribute, eject default, and system connectivity status can be different in each SCDS.

- There is a single pool of scratch volumes to be shared among all the SMS complexes. This pool consists of separate library manager categories for each of the supported media types.

Managing Private Volumes in a Library Sharing Environment

There are two options for the management of private volumes:

1. The simpler option allows sharing of private volumes among all systems in all SMS complexes. This requires that each SCDS have the same set of tape storage group definitions. All storage groups with the same name must reside in the same set of libraries, though the storage group state on each system in the SMS complex can vary. The cartridge entry installation exit must also be the same on all systems.

2. The other option, which proves more difficult, is to restrict access to private volumes to a single SMS complex. Each SCDS can have its own set of tape storage groups; an attempt to use a private volume in a SMS complex where its assigned storage group does not exist causes the job to fail. When existing private volumes are entered into the library, the cartridge entry installation exit must recognize the volumes which belong to its particular SMS complex. If this is not possible, the volumes may be assigned to the blank storage group at cartridge entry time, then selectively assigned to the proper storage group by the storage administrator at some later time.

No matter which private volume management mechanism is selected, it should be noted that a permanent association between the volume and a particular SMS complex is not possible. When the volume use attribute is changed from private to scratch, the volume becomes eligible for use on any system sharing the ATLDS, or the MTLDS.

Partitioning Tape Libraries among Multiple Sysplexes

Partitioning a tape library is dividing the resources in the library—tape drives and tape volumes—among multiple systems or sysplexes, or both, for their exclusive use. The set of tape drives and tape volumes which belong to one or more systems or sysplexes, or both may not be used by a nonsharing system or sysplex without manual intervention. Each sharing partition may be either an MVS platform or a non-MVS platform. A single MVS platform may consist of one or more systems or sysplexes, or both, connected to a shared tape configuration database (TCDB); this group of sharing systems or sysplexes, or both, is referred to as a TCDBplex. Multiple TCDBs may each contain configuration information about the library and some subset of the volumes in the library. Partitioning may thus be viewed as dividing a physical library into multiple logical libraries, with each logical library (TCDBplex) represented by one TCDB. Figure 6 on page 41 provides a pictorial description of library partitioning.

SMSPLEX1   SMSPLEX2   SMSPLEX3
DEVSUP:11-1F   DEVSUP:21-2F   DEVSUP:31-3F
TCDB-A   TCDB-B   TCDB-C
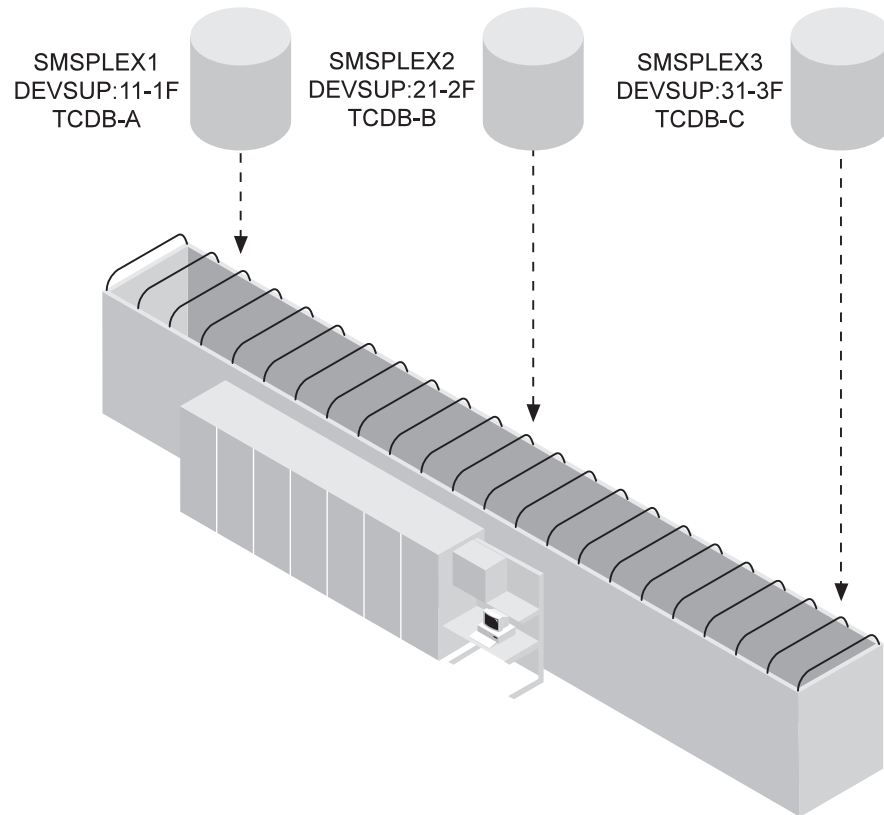
Three SMSplexes and Three TCDBs. Each SMSplex Accesses the Library.

Figure 6. Partitioning a Tape Library

Changing the Library Manager Category Assignments

To partition a library among multiple TCDBplexes requires separation of the scratch pools; that is, each TCDBplex must have a separate library manager category for each scratch media type (cartridge system tape, enhanced capacity cartridge system tape, high performance cartridge tape, and extended high performance cartridge tape). For logical completeness, the error and private volume categories should also be unique to each TCDBplex. The default category assignments are described in Figure 4 on page 35.

To change the default category assignments, instead of applying the partitioning USERMOD, the installation can now specify the categories in PARMLIB member DEVSUPxx. The category specification parameters enable the installation to change the default category assignments associated with a system or sysplex, or both. It is the responsibility of the installation to ensure that all systems or sysplexes, or both, associated with the same TCDB (TCDBplex) use the same category assignments. For a discussion of the partitioning-related DEVSUPxx parameters, refer to *OS/390 MVS Initialization and Tuning Reference*.

In a partitioned library, it is recommended that the installation use DEVSUPxx to change the default categories associated with each TCDBplex. This means that no TCDBplex uses the default categories, so there are no volumes in those categories. If the DEVSUPxx parameters are inadvertently removed from one system, scratch mount requests are directed to the empty default categories and the mount requests fail. If there is a TCDBplex that is using the default categories, volumes

may be mounted by the system where the DEVSUPxx parameters were removed. If a scratch volume from a default category is mounted on the system where the parameters were removed, it is not used since there is no tape volume record in the TCDB. The volume is assigned to the error category with resultant disruption in library operations in the TCDBplex that owns the default categories.

Processing Default Categories When Using DEVSUPxx

If an installation has been running with its tape libraries in unpartitioned mode for some period of time, the tape volumes will already be assigned to default categories. When the partitioning related DEVSUPxx parameters are used, special processing is necessary to move volumes to the new categories established through DEVSUPxx:

- Modify the DEVSUPxx PARMLIB member associated with each system or sysplex, or both, in each TCDBplex.
- IPL all systems in the TCDBplex to activate the DEVSUPxx changes
- Ensure that no jobs which require scratch mounts in a library are run. This may be done by varying all library-resident tape drives offline to all systems.
- Start the OAM address space and make sure that all tape libraries are online. The tape drives must remain offline.
- Obtain a list of volumes whose storage group name is '*SCRTCH*' using the ISMF Mountable Tape Volume Application. It is a good idea to do this one library at a time by also specifying the library name.
- Use the ISMF ALTER command (not the line operator) to change the volume use attribute for all volumes in the list from scratch to scratch. This causes the library manager category for each volume to be changed from the default value to the new value established through DEVSUPxx. All volumes in the default scratch categories and in the error category are changed to the new DEVSUPxx scratch categories.
- It is not necessary to change the category of private volumes. When a private volume is returned to scratch, its category will be changed to one of the new scratch categories.
- Vary the tape drives online as appropriate, and start to run normal tape job streams.

Separating the Volumes for Use in Different TCDBplexes

To ensure that only one TCDBplex has access to any single tape volume, assign a separate range of volume serial numbers to each TCDBplex. Cartridge Entry Installation Exit (CBRUXENT) may be used to accept volume serial numbers in the range assigned to the TCDBplex when they are entered, but to ignore volume serial numbers that are outside the range. Each system in the TCDBplex must have the same installation exit. Each different TCDBplex must have installation exit logic that accepts a different range of volsers.

DFSMSrmm offers a facility (the REJECT ANYUSE command in PARMLIB member EDGRMMxx) that allows an installation to specify those volume serial numbers that are not to be used in this TCDBplex. See "DFSMSrmm Support for Sharing a Tape Library Dataserver" on page 43.

Handling Tape Drives in Partitioned Libraries

When a tape library is partitioned, each tape drive may be online in only one sysplex. If the sysplex does not have JES3 or equivalent support for the sharing of tape drives, the tape drive may be online to only one system within the sysplex. A tape drive may be switched from one sysplex to another by varying the drive offline in the old sysplex and then varying it online in the new sysplex.

To provide optimum tape library performance, assign one of the scratch media types to be preloaded into the integrated cartridge loader (ICL) on each 3495

library-resident tape drive. Varying the drive offline in one place and then online in another place does not change which media type has been assigned to the ICL. If the drive is now online in a different sysplex, the category for the preloaded scratch media type is not one that is defined in the new sysplex. A LIBRARY DISPCL or DISPDRV command displays the category as currently assigned. As part of switching the device to the new sysplex, the operator should use LIBRARY SETCL to assign the scratch media type; this causes the assignment of a category that is defined in the new sysplex. In response to the command, the Library Manager unloads the cartridges that are currently in the ICL and replaces them with cartridges from the scratch category in the new sysplex. See "Displaying the Cartridge Loader Scratch Media Type" on page 79, and "Setting the Cartridge Loader Scratch Media Type" on page 80 for more information.

Sharing Tape Volumes between an SMSplex and a Non-MVS Platform

All library-resident tape volumes used by an SMSplex must be defined in the tape configuration database. This means that cartridge entry must occur on an SMS system. Therefore, all volumes to be used exclusively by SMS, and all volumes to be shared by SMS and a non-MVS platform must be entered on an SMS system. Either the Cartridge Entry Installation Exit or DFSMSrmm may be used to control which cartridges are accepted. Other considerations include:

- If the volumes already contain useful data, they should be assigned the private volume use attribute.
- If the volumes do not contain useful data and they are to be written on the non-MVS platform, they should be assigned the private volume use attribute to prevent their use as scratch volumes by SMS.
- If the volumes do not contain useful data and they are to be written on the SMS system, they may be assigned the scratch volume use attribute.
- All references to the volumes from a non-MVS platform should be specific volume serial number references.
- Private volumes should be returned to scratch only on an SMS system.
- An attempt to mount a volume on one platform will fail if the volume is already in use on another platform.
- Cartridges should be ejected only from an SMS system.

DFSMSrmm Support for Sharing a Tape Library Dataserver

DFSMSrmm provides support for easier installation control over sharing a tape library dataserver. DFSMSrmm provides a cartridge entry installation exit that can be used to help partition volumes in a single tape library dataserver across multiple sysplexes. This can include both VM and MVS platforms, as well as multiple SMSplexes. Support for partitioning with VM is provided based on volume naming convention, and at the individual volume level for volumes defined to DFSMSrmm on MVS. With a single tape configuration database across multiple MVS systems and complexes, a single DFSMSrmm control data set is required. All volumes can be used on any or all systems with no partitioning possible. With carefully selected parameters for DFSMSrmm, you can also partition the tape library dataserver across multiple MVS systems as long as you have a one-to-one correspondence of tape configuration database to DFSMSrmm control data sets. You must use the DFMSMrmm facilities to ensure that a single volume is defined in only a single tape configuration database and its associated DFSMSrmm control data set. Refer to *OS/390 DFSMSrmm Implementation and Customization Guide* for implementation details for these scenarios.

Chapter 3. Installing Your Tape Library Support

This chapter explains how to install and customize your tape library environment.

To simplify the installation process, a library of sample jobs and other useful data sets (SAMPLIB) is shipped with the product. This chapter includes instructions for using SAMPLIB ("Appendix A. SAMPLIB Members" on page 185 contains listings of the SAMPLIB members), and an installation checklist to assist you with the software installation of your tape library. Before running any SAMPLIB member, remember to change the JCL to reflect your installation's requirements (for example, accounting information and data set names).

Verifying Prerequisites

Before proceeding with the installation checklist, verify that the hardware and media requirements "Analyzing Your Processing Environment" on page 31 have been met. For more information on prerequisites for DFSMS and OS/390, refer to *OS/390 DFSMS Migration*. Ensure that all the prerequisites have been installed and thoroughly tested to verify that they operate correctly in your processing environment before proceeding with any other installation steps.

Peer-to-Peer VTS Subsystem Considerations

System levels that do not fully support the Peer-to-Peer VTS Subsystem (DFSMS/MVS V1R3), or support the library but do not have the supporting PTFs installed on the system (DFSMS/MVS V1R4 or V1R5), are able to use the Peer-to-Peer VTS Subsystem; however, toleration PTFs are required. For adequate usability and error reporting capabilities, at least one of the sharing systems must have the full support PTFs installed.

The toleration support recognizes if an attention message is associated with a distributed library and ignores the attention message. Without this support, attention messages from the distributed libraries would be handled as if they came from the composite library, resulting in the operational status of the library being overlayed.

For field miscellaneous equipment specification (MES) procedures for software considerations when coupling the VTS subsystems, refer to the Techdocs Website http://www.ibm.com/support/techdocs.

VTS Import/Export Considerations

System levels that do not support the Import/Export function (DFSMS/MVS V1R3), or support the function but do not have the supporting PTFs installed on the system (DFSMS/MVS V1R4 or V1R5) are able to share a virtual tape server library that exploits this function. Additionally, these levels of DFSMS are also able to share a TCDB containing the exportable and importable volumes. Toleration PTFs are required to allow the sharing of these resources.

The toleration support handles errors when a down-level system attempts to perform functions using logical volumes that are export pending or have been exported at the VTS. It also prevents imported logical volumes from being processed on a down-level system.

TDSI Toleration Considerations

Built into the DFSMS/MVS V1R3 base are toleration considerations for up-level media types and recording technologies. This support recognizes when it is dealing with up-level tape device selection information (TDSI) information and acts accordingly. For example, during cartridge entry processing, a volume whose media type and/or recording technology is not supported at this system level will be left in the insert category to be processed by a system that understands the up-level TDSI values. Also, if the TCDB is being shared across multiple system levels, volume records containing up-level TDSI information will not be displayed through ISMF. This support also prevents operator commands, job requests, and CBRXLCS requests for up-level volumes from being honored. This prevents the system from processing up-level media that it does not fully understand.

3590 Model E Toleration Considerations

The OAM toleration support included in "TDSI Toleration Considerations" handles MEDIA3 and MEDIA4 volumes with 256TRACK recording technology; however, an additional toleration PTF is required on DFSMS levels that recognize MEDIA3 and MEDIA4 but do not have all of the 3590 Model E support installed. This additional support tolerates (by leaving in the insert category) a tape management system returning 256-track recording technology in the cartridge entry installation exit (CBRUXEPL).

Also, system levels that support the 3590 Model B device, but do not have all of the 3590 Model E support installed and enabled are able to share a library with full support systems; however, device services toleration PTFs will be required to prevent the 3590 Model E devices from coming online. Without the toleration PTFs installed, a 3590 Model E device would appear to the lower-level systems as a 3590 Model B device and the TDSI information recorded in the tape configuration (TCDB) volume record would incorrectly indicate 128-track. To avoid sebsequent job failures (with the wrong device type getting allocated), and to avoid having to manually update the TCDB (to correctly show 256-track), it is critical that the toleration support be installed. Installing the full support and enabling PTFs on all systems enables full exploitation of library devices on all attached hosts.

Considerations When Running MVS/ESA as a Guest under VM/ESA®

If MVS/ESA is run as a guest under the VM/ESA operating system, STDEVOPT LIBRARY CTL must be specified in the VM directory entry for the VM userid under which the MVS/ESA guest operating system is IPLed. The STDEVOPT statement specifies the optional storage device management functions available to a virtual machine. The LIBRARY operand with CTL tells the control program that the virtual machine is authorized to issue tape library commands to an IBM Tape Library Dataserver. If the CTL parameter is not explicitly coded, the default of NOCTL is used. NOCTL specifies that the virtual machine is not authorized to issue commands to a tape library, and this results in an I/O error when MVS tries to issue a command to the library. For further information on the STDEVOPT statement, refer to *VM/ESA Planning and Administration Guide* and *VM/ESA Running Guest Operating Systems.*

Tape Library Installation Checklist

This section provides a checklist to assist in your installation of the tape library dataserver support. Refer to "Installation Procedures" on page 48 for more detailed information regarding each of these checklist items. Check off each item as it is completed within your installation.

"Building the Library Inventory" on page 48

__ 1. Build the library inventory.

"Changing System Libraries" on page 49

__ 2. Update PARMLIB.

    __ a. Update SCHEDxx PARMLIB member.

    __ b. Update IGDSMSxx PARMLIB member.

    __ c. Update IEFSSNxx PARMLIB member.

    __ d. Update CONSOLxx PARMLIB member.

    __ e. Update DEVSUPxx PARMLIB member.

    __ f. Update COMMNDxx PARMLIB member.

__ 3. Update PROCLIB, by running CBRAPROC SAMPLIB member.

"Creating the Global Resource Serialization Ring" on page 51

__ 4. Create the global resource serialization ring. (Optional, depending upon your installation.)

"Creating the Tape Configuration Database" on page 52

__ 5. Define the volume catalogs.

    __ a. Define general volume catalog.

    __ b. Define specific volume catalogs (optional, depending upon your installation).

    __ c. Connect the volume catalogs to the SMS complex.

    __ d. Define the RACF®, a component of the SecureWay Server for OS/390 facility class profile.

    __ e. Authorize the storage administrator to the RACF facility class.

"Creating the Hardware Configuration" on page 54

__ 6. Define tape drives using HCD.

"IPLing the System" on page 54

__ 7. IPL the system.

"Creating the SMS Definitions" on page 55

__ 8. Define the base SCDS.

__ 9. Define tape libraries.

__ 10. Define tape storage groups.

__ 11. Define storage classes.

__ 12. Define data classes.

__ 13. Define and test ACS routines.

"Creating the Installation Exit Routines" on page 56

__ 14. Create a cartridge entry installation exit routine (optional, depending upon your installation).

__ 15. Create a change use attribute installation exit routine (optional, depending upon your installation).

__ 16. Create a cartridge eject installation exit routine (optional, depending upon your installation).

__ 17. Create a volume not in library installation exit routine (optional, depending upon your installation).

"Validating the Configuration" on page 57

__ 18. Validate the configuration.

"Activating the SMS Configuration" on page 57

__ 19. Activate the SMS configuration.

"Starting the OAM Address Space" on page 57

__ 20. Start the OAM address space.

"Varying the Library Online" on page 58

__ 21. Vary the library online.

"Display and Set the Cartridge Loader Media Type" on page 58

__ 22. Display and set the cartridge loader media type.

    __ a. Display the cartridge loader media type.

    __ b. Set the cartridge loader media type.

"Running the Job Stream" on page 58

__ 23. Run the job stream.

Installation Procedures

This section provides details to assist in the installation of tape library support in your storage environment.

Building the Library Inventory

1 *Build the library inventory.*

To initially load the library manager inventory in an ATLDS, insert tape cartridges into the library storage slots and start the teach operation at the library manager console. In the case of an MTLDS, tape cartridges can be entered into the library through the INSERT operation at the library manager console. In a virtual tape server (VTS) library, the logical volumes are identified at the library manager console through volume serial number ranges. All cartridges are placed in the insert category by the library manager for later cartridge entry processing by the host. It is later during OAM address space initialization and the host going through vary online processing that the cartridges in the insert category are processed and the records in the TCDB are created. As the host processes each cartridge in the insert category, the cartridge entry installation exit (CBRUXENT) is invoked to approve or deny the entry of the cartridge.

If the volumes in the library are shared between an MVS and a non-MVS platform, see "Sharing Tape Volumes between an SMSplex and a Non-MVS Platform" on page 43. If the volumes are already owned by a non-MVS platform and are no

longer in the insert category, the TCDB volume records must be manually created in order for MVS to have use of the volumes. Because this bypasses the Cartridge Entry Installation Exit, the volumes may also need to be added to your tape management system.

Note: After completing the installation steps, the general-use programming interface, CBRXLCS FUNC=MCE, also may be used to build the MTLDS inventory.

Changing System Libraries

After using SMP/E to install OS/390, change the system libraries using the following procedures.

2 *Update PARMLIB.*

2a *Update SCHEDxx PARMLIB member.*

Note: This step is documented for your information in case you use this book as reference material. With OS/390 V2 R10 this step is no longer needed.

Add the following to the SCHEDxx member:

```
PPT   PGMNAME(CBROAM)      /* OAM ADDRESS SPACE                     */
      KEY(5)               /* USE DFP PROTECT KEY                   */
      NOSWAP               /* NONSWAPPABLE                          */
      SYST                 /* PROGRAM IS SYSTEM TASK--WILL NOT BE TIMED*/
```

This entry adds the OAM initialization module (CBROAM) to the system program properties table (PPT). CBROAM gets control in PSW key 5 when its address space is started and is nonswappable.

2b *Update IGDSMSxx PARMLIB member.*

Update the IGDSMSxx PARMLIB member to include the following OAM-related keywords:

OAMPROC(procname)
> Optional parameter that specifies the procedure name to be used to start the OAM address space. Specify this keyword to start the OAM address space automatically during IPL. The procedure name can be from 1 to 8 characters, and there is no default.

OAMTASK(taskid)
> Optional parameter that specifies the identifier to be used to start the OAM address space. If you specify this keyword without the OAMPROC keyword, it is ignored. This identifier can be from 1 to 8 characters, and there is no default. Code the OAMTASK keyword if you prefer to use an identifier other than the procname when starting the OAM address space. *taskid* is the identifier that is used on the START command. *taskid* corresponds to the 'identifier' parameter of the MVS START command documented in *OS/390 MVS System Commands*.

These optional parameters are used when you want the OAM address space to start automatically as part of SMS initialization. "OAM" can be used as the procedure name, the task identifier, or both.

Note: For examples of the OAM START command and more information concerning the identifier parameter, see "Starting OAM" on page 71. For

more information on the START command, refer to *OS/390 MVS System Commands.* Also, for more details concerning these optional parameters and other keywords associated with the IGDSMSxx PARMLIB member, refer to *OS/390 DFSMSdfp Storage Administration Reference*.

2c *Update IEFSSNxx PARMLIB member.*

Add or update the OAM1 entry in the IEFSSNxx PARMLIB member.

```
OAM1,CBRINIT[,'MSG=xx']
```

where:

MSG=xx Specifies the format of OAM message text:

- MSG=EM specifies message text is in mixed-case English.
- MSG=EU specifies message text is in uppercase English.

  If the MSG parameter is omitted, the default is mixed-case English.

OAM1 is the name of the subsystem, and CBRINIT is the name of the initialization module executed at IPL time.

2d *Update CONSOLxx PARMLIB member.*

To define a library console to MVS that allows console name message routing, perform the following steps:

- Update PARMLIB member PARMLIB(CONSOLxx).
  - Add console definitions for each library in your SCDS; an example follows:

    ```
    CONSOLE DEVNUM(device number)
            NAME(library console name)
            UNIT(terminal type)
            AUTH(SYS,IO)
            (...)
    ```
  - The library console name matches the console name defined in your SCDS using the ISMF library definition panel.

    The authorities (SYS and IO) are suggested in order to perform the modify commands for OAM and the VARY commands for MVS.

Refer to *OS/390 MVS System Commands* and *OS/390 MVS Planning: Operations* for further information regarding multiple console support (MCS) definitions.

2e *Update DEVSUPxx PARMLIB member.*

Normally, when a scratch volume recorded in 36-track mode is mounted on a 3490 drive that reads and writes in 18-track mode or a scratch volume recorded in 256-track is mounted on a 3590 Model B device that reads and writes in 128-track mode, the operating system rejects the mounted volume and asks for another volume to be mounted. This is because the data set labels on the volume cannot be read and validated. If you wish the volume to be used, create a DEVSUPxx member of PARMLIB and specify VOLNSNS=YES.

If you are partitioning the library, use the DEVSUPxx library partitioning-related parameters to change the system default category assignments. Refer to *OS/390 MVS Initialization and Tuning Reference* for more information regarding DEVSUPxx.

3 *Update PROCLIB, by running CBRAPROC SAMPLIB member.*

Sample jobs are provided in SAMPLIB to assist you in making the needed additions
to PROCLIB. Before running each SAMPLIB member:
- Update the JOB statement.
- Ensure that the high-level qualifier on the `//OUT DD JCL` statement matches the
  naming standard at your installation.

Run SAMPLIB member CBRAPROC (see "SAMPLIB Member CBRAPROC" on
page 232) to create member OAM in PROCLIB. The following member is created
as the default:

```
//OAM PROC OSMC=YES,MAXS=2,UNLOAD=9999,EJECT=LRW,RESTART=YES
//IEFPROC EXEC PGM=CBROAM,REGION=0M,
//  PARM=('OSMC=&OSMC,APLAN=CBROAM,MAXS=&MAXS,'
//        'UNLOAD=&UNLOAD,EJECT=&EJECT,RESTART=&RESTART')
//SYSABEND DD SYSOUT=A
```

Note: The default can be used since most of the parameters are only applicable if
OAM is used to store objects. For more information concerning the
RESTART parameter, see "Restarting OAM" on page 73. For information
concerning the other parameters associated with this procedure statement,
refer to *OS/390 DFSMS OAM Planning, Installation, and Storage
Administration Guide for Object Support*.

Creating the Global Resource Serialization Ring

4 *Create the global resource serialization ring.*

If you are going to share the tape library among two or more systems in an SMS
complex, a global resource serialization ring may be created to include all sharing
systems. This allows OAM to serialize the cartridge entry process for more efficient
operation. For general information about global resource serialization, refer to
OS/390 MVS Planning: Global Resource Serialization.

The global resource serialization configuration is defined in member GRSCNFxx of
PARMLIB, which is described in the *OS/390 MVS Initialization and Tuning Guide*.
The following resource names are obtained at the DFSMS/MVS V1R3 level:

```
QNAME-SYSCBR
RNAME-CARTRIDGE_ENTRY_libname
```

In addition to this, the following resource names are obtained with subsequent
releases:

```
QNAME-SYSZCBR
RNAME-CARTRIDGE_ENTRY_libname
```

For export processing, the following resource names are used:

```
QNAME-SYSZCBR
RNAME-EXPORTED_CATEGORY_libname
```

For a further discussion of the resource names used by OAM during cartridge entry
processing, see "Using Global Resource Serialization with Cartridge Entry
Processing" on page 22. For further information regarding resource names used by
OAM during VTS export processing, see "Using Global Resource Serialization with
Export Processing" on page 29.

Note: OAM already sends a SYSTEMS level enqueue around the global resource serialization ring, so there is no need to include the QNAME or RNAME in the system inclusion RNL. The QNAME and RNAME are provided for documentation purposes.

Creating the Tape Configuration Database

5 *Define the volume catalogs.*

Use the AMS DEFINE command to define the general volume catalog hlq.VOLCAT.VGENERAL. The general VOLCAT is the default volume catalog and contains all of the library records as well as any volume records that do not reside in a specific volume catalog. This volume catalog must exist before any tape library can be defined.

If a large number of tape volumes have the same first character in the volume serial number, it may be advisable to define specific volume catalogs (hlq.VOLCAT.V*x*), where *x* is the first character of the volume serial.

Note: The letter **V** is reserved exclusively as the first character in a VOLCAT volume serial number. It readily identifies the volume serial number as belonging to a VOLCAT. To avoid confusion with the VOLCAT naming conventions, the letter **V** is restricted from being used as the first character of a tape library name. Any other character is valid.

Refer the *OS/390 DFSMS Access Method Services for Catalogs* manual for more information on the DEFINE command and the *OS/390 DFSMS: Managing Catalogs* for more information on estimating the size of the catalogs. Keep in mind that each virtual tape server can contain thousands of volumes.

5a *Define general volume catalog.*

The following example shows how to define the general volume catalog, hlq.VOLCAT.VGENERAL.

```
//DEFVCAT  JOB   ...
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT DD    SYSOUT=A
//SYSIN    DD    *
    DEFINE USERCATALOG -
           (NAME(hlq.VOLCAT.VGENERAL) -
           VOLCATALOG -
           VOLUME(338001) -
           CYLINDERS(1 1))
/*
```

The catalog parameters are:

NAME	Specifies the volume catalog, hlq.VOLCAT.VGENERAL.
VOLCATALOG	Specifies that the user catalog is a volume catalog.
VOLUME	Specifies that the user catalog is to reside on volume 338001.
CYLINDERS	Specifies that one cylinder is allocated to the catalog and that when the catalog is extended, it extends in increments of one cylinder.

All other parameters are allowed to default.

Note: The system uses "SYS1" as the default high-level qualifier (hlq). You may choose any other high-level qualifier in its place. For more information on changing the high-level qualifiers for VOLCATs, refer to *OS/390 DFSMS: Managing Catalogs*.

5b *Define specific volume catalogs.*

The following example shows how to define a specific volume catalog, hlq.VOLCAT.VT. The catalog contains all the volume entries for tape volumes with the first character of **T** in the volume serial number.

```
//DEFVCAT  JOB   ...
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT DD    SYSOUT=A
//SYSIN    DD    *
     DEFINE USERCATALOG -
           (NAME(hlq.VOLCAT.VT) -
           VOLCATALOG -
           VOLUME(338001) -
           CYLINDERS(1 1))
  /*
```

The catalog parameters are:

NAME	Specifies the volume catalog, hlq.VOLCAT.VT.
VOLCATALOG	Specifies that the user catalog is a volume catalog.
VOLUME	Specifies that the user catalog resides on volume 338001.
CYLINDERS	Specifies that one cylinder is allocated to the catalog and that when the catalog is extended, it extends in increments of one cylinder.

All other parameters are allowed to default.

Note: The system uses "SYS1" as the default high-level qualifier (hlq). You may choose any other high-level qualifier in its place. For more information on changing the high-level qualifiers for VOLCATs, refer to *OS/390 DFSMS: Managing Catalogs*.

5c *Connect the volume catalogs to the SMS complex.*

Connect the volume catalogs to all other systems in the SMS complex that use the tape library.

Use the AMS IMPORT command to connect the general volume catalog, *hlq.VOLCAT.VGENERAL* and any specific volume catalog, *hlq.VOLCAT.Vx.*

The following function must be performed on each system in the SMS complex except the one where the catalogs have been defined.

```
IMPORT CONNECT VOLCATALOG OBJECTS((hlq.VOLCAT.VGENERAL) operands)
IMPORT CONNECT VOLCATALOG OBJECTS((hlq.VOLCAT.Vx) operands)
```

5d *Define the RACF facility class profile.*

Define the RACF facility class profile for access to the tape configuration database.

If you use RACF to protect your system resources, enter the following command from an authorized TSO session:

```
RDEFINE FACILITY STGADMIN.IGG.LIBRARY options
```

5e *Authorize the storage administrator to the RACF facility class*

The storage administrator TSO logon ID must be authorized for READ-level access to the facility class. Enter the following command to authorize the storage administrator for READ-level access.

```
PERMIT  STGADMIN.IGG.LIBRARY CLASS(FACILITY) ACCESS(READ) ID(logonID)
```

Refer to *OS/390 SecureWay Security Server RACF Command Language Reference* for more information.

Creating the Hardware Configuration

6 *Define tape drives using HCD.*

Use the MVS hardware configuration definition (HCD) to define the tape drives that belong to the tape library. Specify the LIBRARY parameter as YES.

The devices are recognized as tape library devices as they are initialized during IPL and during IODF activation.

When you define the tape drives, you can optionally specify the LIBRARY-ID and LIBPORT-ID parameters. If a tape drive is then busy or unavailable at system IPL, the drive is configured based on the information provided in the optional parameters and a subsequent IODF activate should not be required. Without specification of the optional parameters, tape drives that are busy or unavailable at system IPL are not included in the library control blocks built by the system and are not eligible for allocation until the tape drives become available and an IODF ACTIVATE is issued. For further information, see "IPLing the System". Refer to *OS/390 HCD User's Guide* for additional information about using the HCD.

Note: For a Peer-to-Peer VTS Subsystem, the LIBRARY ID specified should be the composite library ID.

Because a library may contain emulated devices, successful communication to at least one device in a subsystem must be made to determine if the devices defined through HCD are real or emulated. If the communication cannot be made during system IPL, the devices in the subsystem will not be considered eligible for allocation until successful communication has been established with the MVS VARY, ONLINE command. This will prevent the wrong device from being considered in allocation recovery.

IPLing the System

7 *IPL the system.*

Use the new I/O configuration definition that contains the library tape drive definitions to IPL the system. This also activates the OAM1 subsystem. The system issues the following messages and you can use them to verify a successful IPL of the system.

CBR8001I OAM1 subsystem initialization starting.

Note: If your installation is not using OAM to store objects, and is strictly using OAM for tape library management, ignore the following messages when they are displayed during IPL:

CBR8007I No DB2 SSID or the DB2 SSID value of "NONE" has been specified. OTIS subsystem cannot successfully initialize.

CBR8002I OAM1 subsystem initialization completed.

Devices Unavailable at IPL: If message IEA438I is issued during system IPL indicating that devices were not available during the IPL process (perhaps they were in use on another system), perform the following steps:

1. Issue the MVS VARY command to vary the devices online.

2. Issue the ACTIVATE command to activate the IODF containing the devices that were unavailable.

If your installation is using OAM for object support (DASD, optical, or tape), refer to *OS/390 DFSMS OAM Planning, Installation, and Storage Administration Guide for Object Support* for more information.

Creating the SMS Definitions

Creating Definitions with ISMF: ISMF provides a series of panels through which SMS constructs can be defined. Refer to *OS/390 DFSMS: Using the Interactive Storage Management Facility* for detailed information about using ISMF. Use ISMF to:
- Define the base SCDS
- Define the libraries in the tape configuration database
- Define storage groups
- Define storage classes
- Define data classes
- Write and test ACS routines
- Validate the SCDS

Before proceeding with the following topics, study the relevant information concerning creating the SMS definitions in "Appendix B. ISMF Panels to Define and Monitor Your Configuration" on page 245, and the *OS/390 DFSMSdfp Storage Administration Reference*. This book, along with the online ISMF functional and help panels, explains the items you specify using ISMF.

8 *Define the base SCDS.*

The procedure for defining a source control data set is provided in *OS/390 DFSMSdfp Storage Administration Reference*. It is possible to define several source control data sets describing different configurations; however, only one SCDS can be activated at any time.

9 *Define the tape libraries.*

You need to define your tape library to add the library record to the TCDB and the library definition to the specified SCDS. Choose option 3, DEFINE, on the ISMF Tape Library Application Selection panel (Figure 42 on page 247) to display the ISMF Tape Library Define panel shown in Figure 43 on page 248 and in Figure 44 on page 250. When defining the Peer-to-Peer VTS Subsystem, remember to define not only the composite library but also the underlying distributed libraries.

10 *Define tape storage groups.*

Use ISMF to define your tape storage groups and the library names associated with the storage groups. For more information on how to define tape storage groups,

refer to the *OS/390 DFSMSdfp Storage Administration Reference*, *MVS/ESA SML: Leading a Storage Administration Group*, and *OS/390 DFSMS: Implementing System-Managed Storage*. To direct allocation to a Peer-to-Peer VTS Subsystem, the composite library should be used and not the associated distributed libraries.

11 *Define storage classes.*

Use ISMF to define storage classes that cause the installation storage group filter routine to select tape storage groups. The storage class determines whether or not a request is SMS-managed. If a storage class is not assigned, the request is not SMS-managed.

12 *Define data classes.*

Define data classes to direct your nonspecific requests to a specific media type and recording technology, and to specify whether compaction is required. Choose option 4 on the ISMF Primary Option Menu panel to display the ISMF Data Class Define panel to define your data classes.

13 *Write and test ACS routines.*

Create or modify the installation's storage class, data class, and storage group ACS routines to select tape constructs for certain types of new data requests. There can be only one set of ACS routines in an active configuration. Refer to *OS/390 DFSMSdfp Storage Administration Reference* for information on using ISMF to define ACS routines.

Creating the Installation Exit Routines

14 *Create a cartridge entry installation exit routine—CBRUXENT.*

If all cartridges entered into the library have the same use attribute and the same tape device selection information (TDSI), these values can be assigned using the entry default use attribute and the entry default data class on the library definition.

If cartridges are to have different use attributes, TDSI, or both, you need to write a cartridge entry installation exit routine. You may use SYS1.SAMPLIB member CBRSPUXE as a model. Otherwise, the system uses the installation exit provided with DFSMSrmm. For detailed information on the installation exit, see "Cartridge Entry Installation Exit (CBRUXENT)" on page 156.

15 *Create a change use attribute installation exit routine—CBRUXCUA.*

If you need to influence the process of changing a volume's use attribute (for example, by preventing the return of a private volume to scratch), you need to create an installation exit routine of your own. You may use SYS1.SAMPLIB member CBRSPLCS as a model. Otherwise, the system uses the installation exit provided with DFSMSrmm. For detailed information on the installation exit, see "Change Use Attribute Installation Exit (CBRUXCUA)" on page 149.

16 *Create a cartridge eject installation exit routine—CBRUXEJC.*

If you want to be able to prevent the ejection of a cartridge from the library or to change the tape volume record for an ejected cartridge, you need to create an installation exit of your own. You may use SYS1.SAMPLIB member CBRSPUXJ as

a model. Otherwise, the system uses the installation exit provided with DFSMSrmm. For detailed information on the installation exit, see "Cartridge Eject Installation Exit (CBRUXEJC)" on page 164.

17 *Create a volume not in library installation exit routine—CBRUXVNL.*

If you want to be able to insert a volume into a tape library during job set up, device allocation, or library mount processing to prevent job failures, you need to create an installation exit routine of your own. You may use SYS1.SAMPLIB member CBRSPUXV as a working model. Otherwise, the system uses the installation exit provided with DFSMSrmm. For detailed information on the installation exit, see "Volume Not in Library Installation Exit (CBRUXVNL)" on page 172.

Note: Customer written installation exits are optional.

Validating the Configuration

18 *Validate the configuration.*

You cannot use tape libraries until a configuration containing all the elements described in this chapter are defined and validated. Refer to *OS/390 DFSMSdfp Storage Administration Reference* for information about validating the configuration that you have just defined.

Activating the SMS Configuration

19 *Activate the SMS configuration.*

Activate the SMS configuration that contains the library definitions. Only one SCDS can be activated at any time. Activating another SCDS or reactivating the current SCDS while OAM is running causes OAM to restart by default, unless RESTART=NO is specified on the OAM PROCLIB member. During this reinitialization, all libraries are set either online or offline according to the attributes defined in the activated SCDS.

Note: How soon OAM is notified of the SCDS activation depends on the time interval specified with the INTERVAL keyword in the IGDSMSxx PARMLIB member.

Starting the OAM Address Space

20 *Start the OAM address space.*

Start the OAM address space using the MVS START command. See "Starting OAM" on page 71 for the syntax of the START command. Or the system programmer can update the IGDSMSxx member of PARMLIB to start OAM automatically during MVS IPL. "Changing System Libraries" on page 49 includes information concerning updating the IGDSMSxx member of PARMLIB.

Note: The OAM address space must have been started on at least one of the systems connected to each library to complete the definition of the library or libraries in the TCDB. This completed information in the TCDB is needed to properly run subsequent job streams.

Varying the Library Online

21 *Vary the library online.*

Vary the library online using the SMS VARY command. See "Varying a Tape Library Online or Offline" on page 72 for the syntax of the VARY command.

If the library was defined as online to the system, it is brought online as part of OAM address space initialization.

Display and Set the Cartridge Loader Media Type

22 *Display and set the cartridge loader media type for the 3495.*

22a *Display the cartridge loader media type.*

Use the MVS LIBRARY DISPCL or the LIBRARY DISPDRV command to display the scratch volume media type assigned to the cartridge loader of each library-resident tape drive. See "Displaying the Cartridge Loader Scratch Media Type" on page 79 and "Displaying Tape Drive Status" on page 89 for the command syntax.

22b *Set the cartridge loader media type.*

Use the MVS LIBRARY SETCL command to set the media type of scratch volumes to be loaded into the cartridge loader of each library-resident tape drive. See "Setting the Cartridge Loader Scratch Media Type" on page 80 for the command syntax.

Running the Job Stream

23 *Run the job stream.*

You can now run a job stream that uses library-resident volumes.

Library Subsystem Modifications

This section discusses the steps that are necessary when tape subsystems are added, moved or deleted. A cable change within a library that switches ports so that existing subsystems are now associated with different subsystem IDs should be treated as if the subsystems had been physically moved.

For an existing library, prior to modifying the subsystem configuration, use the VARY SMS command to VARY the library offline to each attached host. After the necessary IODF ACTIVATEs or optional IPL, use the LIBRARY DISPDRV command to verify that the correct number of devices appear in the library configuration and that no device appears multiple times in the display for that library.

Adding Subsystems to a Library

The simplest way to add new subsystems to a new or existing library is to add previously undefined library devices to the physical end of the library. This keeps the existing subsystems associated with the same subsystem IDs and the new subsystems associated with the next sequential subsystem IDs. To add subsystems to a new or existing library, perform the following steps:

1. Use the MVS hardware configuration definition (HCD) to add the new tape devices to the existing or a new IODF.
2. Activate the IODF containing the new tape devices using the MVS ACTIVATE command.
3. Vary the devices online to MVS using the MVS VARY command.
4. Once again activate the IODF containing the new tape devices to complete the configuration activity using the MVS ACTIVATE command.

   Note: Steps 1–4 can be replaced with a system IPL using the IODF that was created in step 1.

If one or more of the subsystems being added to the physical end of the library (library A) had previously existed in another library (library B), perform the following steps:
1. Use the MVS hardware configuration definition (HCD) to delete all devices from library B.
2. Activate the IODF that has the devices from library B removed using the MVS ACTIVATE command.
3. Use HCD to add all of the devices that are now in library A and in library B.
4. Activate the IODF that has all the devices defined using the MVS ACTIVATE command.
5. Vary the devices online to MVS using the MVS VARY command.
6. Once again, activate the IODF containing all of the tape devices to complete the configuration activity using the MVS ACTIVATE command.

   Note: Steps 1–6 can be replaced with a system IPL using an IODF containing all of the moved or new devices, or both.

If the subsystems being added are not added to the physical end of the library, refer to "Moving Subsystems Within a Library".

Moving Subsystems Within a Library

If existing subsystems are physically moved within a library so that the subsystems are now associated with different subsystem numbers (for example, if the new subsystems are not added to the physical end of the library), perform the following steps to properly rebuild the new configuration:
1. Use HCD to delete all devices form the library or libraries involved (multiple libraries might be involved if the devices came from another library).
2. Activate the IODF that has all the devices from the libraries removed using the MVS ACTIVATE command.
3. Use HCD to add all of the devices that are now in each affected library.
4. Activate the IODF that has all the devices defined using the MVS ACTIVATE command.
5. Vary the devices online to MVS using the MVS VARY command.
6. Once again, activate the IODF containing all the tape devices to complete the configuration activity using the MVS ACTIVATE cammand.

   Note: Steps 1–6 can be replaced with a system IPL using the IODF containing all of the library devices.

Deleting Subsystems From a Library

If existing subsystems are physically removed from a library, then perform the following steps to accurately reflect the new configuration:

1. Use HCD to delete all devices from the library.
2. Activate the IODF that has the devices from the library removed using the MVS ACTIVATE command.
3. Use HCD to add all of the devices that are now in the library.
4. Activate the IODF that has all the devices defined using the MVS ACTIVATE command.
5. Vary the devices online to MVS using the MVS VARY command.
6. Once again, activate the IODF containing all of the tape devices to complete the configuration activity using the MVS ACTIVATE command.

> **Note:** Steps 1–6 can be replaced with a system IPL using an IODF that has the deleted devices removed.
>
> If the deleted subsystems are then added to another library, follow the steps documented in "Adding Subsystems to a Library" on page 58.

The sections above assume that as subsystems are added, moved, or deleted, previously existing subsystems may now be associated with different subsystem IDs. The sections above also document the steps necessary regardless of whether the subsystem IDs at the library manager have changed.

If the steps documented in the sections above are not followed, you may have the same device being configured in multiple device pools or the appearance of more drives then are actually in the library, or both, resulting in subsequent failures during library processing.

Chapter 4. Defining and Monitoring Your Configuration

This chapter discusses typical administration tasks for defining and monitoring the SMS configuration associated with your tape library:
- Monitoring and maintaining the tape configuration
- Monitoring and maintaining SMS constructs and definitions
- Establishing recovery procedures
- Retrieving data from a disabled IBM automated tape library

Monitoring and Maintaining the Tape Configuration

ISMF makes it possible to monitor and maintain information associated with the tape configuration database, the source control data set, and the tape volumes that reside in automated and manual tape library dataservers.

Typical Library Management Functions

The ISMF Library Management option allows you to generate lists of tape libraries and volumes, display the attributes of a tape library, alter definitions that were originally defined, add new definitions, audit tape libraries and tape volumes, and eject tape volumes from the tape library.

This section discusses the effects of some typical configuration maintenance tasks. See "Appendix B. ISMF Panels to Define and Monitor Your Configuration" on page 245 for information concerning the use of ISMF with tape libraries, and refer to *OS/390 DFSMS: Using the Interactive Storage Management Facility* for detailed information about using ISMF.

Defining Tape Libraries

The first time a tape library is defined, the storage administrator enters all the appropriate attribute definitions associated with the tape library being defined on the ISMF define panels. Once all the information is entered, an entry containing that information is added to the tape configuration database (TCDB). Also, a tape library definition is added to the specified source control data set (SCDS). For more detail concerning defining tape libraries using ISMF, refer to "Defining a Tape Library" on page 245.

When you attempt changes to the attribute definitions of an existing tape library, the information residing in the TCDB associated with the tape library is displayed through a Redefine panel. Changing any of the attributes previously defined results in an update to the TCDB and to the specified SCDS. For more information on redefining tape libraries, refer to "Redefining a Tape Library" on page 255.

Note: Only one SCDS can be activated at any time. Activating another SCDS or reactivating the current SCDS while OAM is running causes OAM to restart by default, unless RESTART=NO is specified in the OAM PROCLIB member. During this restart, all libraries are set to either online or offline according to the attributes defined in the SCDS. After the restart completes, display all libraries to verify that they are set to the desired operational state.

Altering the Tape Library Definition

Altering a tape library definition results in an update to the corresponding library record in the TCDB and the SCDS. For more information on altering a tape library, see "Altering a Tape Library" on page 258.

Note: The altered library definition takes effect when the SCDS is activated and OAM is restarted.

Managing the Tape Volume

The ISMF Library Management function also assists in the maintenance and verification of the tape volumes within the tape library dataservers through the use of the Mountable Tape Volume Application available from the Tape Library Application Selection panel (option 1—LIST).

Note: If the TCDB is being shared across multiple system levels, volume records containing TDSI information that are not understood by the level of software on the system are not displayed when a volume list is requested from ISMF. This prevents the system from processing volume records containing TDSI information that is not understood by the system.

Using the Mountable Tape Volume Application, storage administrators can use line operators or ISMF commands to perform inventory tasks against tape libraries and tape volumes. The following functions can be performed using the Mountable Tape Volume Application:

- **AUDIT** a volume, a list of volumes, or a tape library
- **ALTER** the use attribute, storage group, shelf location, or owner information of a volume or list of volumes
- **EJECT** a single tape volume

For more detail on the use of the Mountable Tape Volume Application, see "ISMF Mountable Tape Volume Application" on page 263.

Auditing the Tape Library Volume

The AUDIT function in an ATLDS helps you verify the physical location of tape volumes within the library. It verifies whether or not a library volume resides in the location listed for that volume in the library manager inventory. The AUDIT function in an MTLDS verifies that a volume record exists in the library manager database. Since there is no vision system, no physical verification takes occur. The library manager maintains the library location of the cartridges in its inventory. The volume records in the TCDB identify the libraries where the volumes reside. If the TCDB records do not match the library manager inventory when an audit is performed, the TCDB records, the inventory, or both, must be corrected. The AUDIT function does not perform any corrective actions; messages are issued and the volume error status field in each tape volume record is updated, but the purpose of the audit is verification only. For more information concerning auditing tape volumes with ISMF, see "Auditing Volumes in a Tape Library" on page 273.

Note: In an environment with multiple systems at different software levels but sharing a common TCDB, library audits should be performed on the system with the highest software level. A library audit on a lower software level does not include higher release level volumes if they are media types unknown to the lower level software.

Altering the Tape Volume Record

ISMF allows you to alter the use attribute, storage group, shelf location, and owner information of a single tape volume or a list of tape volumes through the use of the ALTER line operator or the ISMF ALTER command. These commands are used from the Mountable Tape Volume List panel (see Figure 61 on page 267). For more detail regarding the ISMF alter commands, see "Altering the Volume Record" on page 277.

Ejecting the Tape Volume With the EJECT Line Operator

The EJECT line operator is used to eject a single library-resident volume from a tape library with the option of keeping or purging the associated tape volume record within the TCDB. The EJECT line operator command is used from the Mountable Tape Volume List application of ISMF. For more information concerning this line operator and the Mountable Tape Volume List, see "Ejecting a Volume from a Tape Library" on page 283 and Figure 61 on page 267.

Monitoring and Maintaining SMS Library Definitions

ISMF library management makes it possible to monitor and make changes to the SMS library definitions. Refer to *OS/390 DFSMS: Using the Interactive Storage Management Facility* for detailed information about using ISMF.

Changing OS/390 Construct Definitions

As installation requirements change, it may be necessary to update data class, storage group, and storage class definitions in your ACS routines. Definitions for these constructs can be modified using the ISMF ALTER panels.

These updates must be done with caution because volumes that do not require processing after the definitions are changed are not affected by the change, even though they are assigned to the group to which the new definition applies. The updated definitions are used *only* for volumes entering the system or processed by the system after the change.

Maintaining Tape Storage Group Definitions

New storage groups may be needed for separation of new types of volumes. In addition to defining the new tape storage groups, it is necessary to modify the ACS routines to use the new tape storage groups.

It is important to consider when designing these changes that existing volumes do not change their storage group assignments until they are changed to scratch and then back to private.

Changing ACS Routines

As mentioned above, ACS routines may need to be changed to support changes in storage group, data class, or storage class definitions. Defining new storage groups, data classes, or storage classes has no affect unless the ACS routines are changed to select those new constructs.

ACS routines can be changed to provide initial class defaults for new volumes. Defining new classes does not always mean new values for parameters; a new class can have the same parameters as an existing class. A new class may be created to make the relationship between a class and an application more understandable. This action makes it possible to modify parameters later to fit the needs of one application without affecting other applications.

A Final Note of Caution about Changing SMS Library Definitions: Changing existing library definitions may not affect all volumes associated with those definitions. Only those being stored after the library definitions have been changed are affected.

Establishing Recovery Procedures

As part of your disaster recovery plan, you should establish and test procedures for recovering the following entities:

- Tape configuration database
- Library entries in the volume catalog
- Volume entries in the volume catalog

Recovering Volume Catalogs

OAM attempts to keep volume catalog entries current. This cannot be accomplished if the catalog entry does not exist or if the catalog is unusable (for example, because of I/O errors). Recovery of the catalog may be required. Standard catalog recovery procedures apply to recovering volume catalogs. Those procedures usually involve making an image copy (for example, IDCAMS EXPORT) at certain intervals and restoring that copy (for example, IDCAMS IMPORT) to recover an unusable catalog, then applying changes to individual records based on some ICF transaction log (for example, SMF records).

Note: For further information on the use of IDCAMS with catalog entries, refer to *OS/390 DFSMS Access Method Services for Catalogs*.

Recreating Library Entries

If library entries are added or deleted after the image copy is made, restoring an image copy does not complete the recovery; you must also recreate those added or deleted entries. Use IDCAMS CREATE or IDCAMS DELETE to create or to delete the library entries.

If library entries are modified after the image copy is made, use IDCAMS ALTER to update the library entry to its current state.

Note: Attempt this level of recovery only if the transaction log recovery cannot be used. For further information on the use of IDCAMS with library entries, refer to *OS/390 DFSMS Access Method Services for Catalogs*.

Recreating Volume Entries

If volume entries are added or deleted after the image copy is made, restoring an image copy does not complete the recovery; you must also recreate those added or deleted entries. Use IDCAMS CREATE or IDCAMS DELETE to create or to delete the volume entries.

If volume entries are modified after the image copy is made, use IDCAMS ALTER to update the volume entry to its current state.

Note: Attempt this level of recovery only if the transaction log recovery cannot be used. For further information on the use of IDCAMS with volume entries, refer to *OS/390 DFSMS Access Method Services for Catalogs*.

Disaster Recovery Site Considerations

If you plan to run your disaster recovery test on a system where there is no ATL, then you must EXPORT DISCONNECT the TCDB from that remote system so that normal stand-alone drive allocation paths are used by SMS and MVS allocation. Your ACS routines should also be reviewed and changed, if necessary, to ensure that they are not assigning an ATL storage group that forces the allocation to the ATL.

Note: For further information on the use of IDCAMS EXPORT of VOLCAT, refer to *OS/390 DFSMS Access Method Services for Catalogs.*

TCDB Procedure for Retrieving Data from a Disabled IBM Automated Tape Library

There may be a time when you might experience a problem that could disable your IBM automated tape library. The following procedure provides instructions for retrieving data from an IBM automated tape library after a serious library manager failure occurs with the PC controller. By following this procedure, you can allocate your library volumes to stand-alone devices to retrieve your data after a few modifications to the TCDB and possibly the job stream. This procedure is only a short-term solution and should only be used if there is an immediate need for the data in the disabled IBM automated tape library.

Altering Private Tape Configuration Database Records

Alter the TCDB for each private volume serial number from the disabled library that you plan to use. Use IDCAMS or a utility from your tape management system that invokes the IDCAMS facility. The LOCATION field in the TCDB must be altered from LIBRARY to SHELF. When altering the LOCATION field, IDCAMS also modifies the LIBRARYNAME field to SHELF. This field value change allows the private volume serial numbers to be used outside the library for non-SMS-managed requests. After the library manager is back online, and the volumes are returned to their home cells, the LOCATION and LIBRARYNAME fields in the TCDB must be altered. The LOCATION field must be altered back to LIBRARY and the LIBRARYNAME field must be altered to reflect the library name where the volumes reside.

The following are examples for the JCL for IDCAMS:

```
//ALTERVOL JOB 'NAME',MSGCLASS=H,MSGLEVEL=(1,1),CLASS=A
//********************************
//*ALTER THE LOCATION FIELD TO SHELF FOR OAM100
//********************************
//ALTER  EXEC PGM=IDCAMS
//SYSPRINT DD  SYSOUT=*
//SYSIN DD *
  ALTER VOAM100-
  VOLUMEENTRY-
  LOCATION(SHELF)
/*
//

//ALTERVOL JOB 'NAME',MSGCLASS=H,MSGLEVEL=(1,1),CLASS=A
//********************************
//*ALTER THE LOCATION FIELD TO LIBRARY AND THE
//*LIBRARYNAME FIELD TO ATLF4007 FOR OAM100
//********************************
//ALTER EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
  ALTER VOAM100-
     VOLUMEENTRY-
     LOCATION(LIBRARY)-
     LIBRARYNAME(ATLF4007)
/*
//
```

Changing from SMS-Managed to Non-SMS-Managed Requests

JCL jobs and applications that refer to scratch requests or to altered shelf-resident private volumes using DISP=NEW can be changed from SMS-managed to non-SMS-managed requests in one of two ways:

1. Modify the JCL or application associated PARMLIB member so that the requests are treated as non-SMS-managed requests.
2. Activate a new SCDS that treats the existing JCL and applications with no modifications as non-SMS-managed requests.

By changing to a non-SMS-managed request in the ACS routine, MVS allocation selects a non-SMS-managed device during the allocation process. Examine the constructs and the criteria used in the ACS routines to determine what requests need to be changed to non-SMS-managed.

Note: If storage groups selected from the ACS routine span multiple libraries, scratch allocations are automatically directed to the other libraries.

Changing the Use Attribute of Scratch Volumes

If you are using scratch volumes from the disabled library, then after the disabled library is back online either:

1. Use ISMF to alter the use attribute and the storage group, or
2. Code a CBRXLCS CUA™ invocation to change the use attribute from S to P and the appropriate storage group from *SCRTCH*

Either of these procedures must be done before any scratch requests are submitted. If one of them is not performed, then previously written data may be overwritten on the next scratch request to that library since the scratch volumes used still exist in a scratch category in the library manager inventory.

If you are using scratch volumes outside the disabled library, then after the disabled library is back on-line, enter those newly written volumes into the library and assign a use attribute of P and a storage group to preserve the data written on the volumes.

JCL jobs and applications that are referencing existing data on the altered private volumes with DISP=OLD or DISP=MOD may not require any changes. In this case, the ACS routines are not invoked and a device gets allocated based solely on the specified UNIT parameter indicated in the JCL or associated with the application program.

Note: If you have OAM Object Tape support and have altered the SETOAM parameters in the CBROAMxx PARMLIB member, you must restart the OAM address space in order for these changes to take effect.

Using the Sample Exit for Volume Not In Library (CBRUXVNL)

After submitting the jobs and applications for the altered private volume serial numbers, the operator replies to a message from the CBRUXVNL exit. The operator either replies CONT to continue the request to a stand-alone device, or DISABLE to deactivate the volume not in library exit for future replies. By disabling the CBRUXVNL exit, the requests for the altered volume serial numbers are allocated to stand-alone devices, but for SMS-managed requests for volumes that reside on the shelf, the jobs fail. The CBRUXVNL exit can be reenabled by using the OAM LIBRARY RESET,CBRUXVNL command.

Library Manager Database Volume List

It is important to maintain a volume list that has the current home cell locations for your library volumes. This volume list can be obtained from the library manager console by selecting DATABASE from the main menu pull-down window and then selecting a function called LIST DATABASE VOLUMES. This function generates a volume list that has the current home cell locations. This list can be saved on a diskette and referenced or printed with any remote PC ASCII editor. If you configured your Home Cell Mode to FLOAT, this operation will have to be run more often than if this mode was configured to FIXED. Floating home cells can change after volumes are demounted from the library devices. Maintaining these cell locations prevents the operator from manually searching for volumes in the disabled library.

Returning the Library Manager to an Operational Status

After the tape library is returned to an operational state, restore your modified JCL, PARMLIB members, and the TCDB records to their original values. Use the SMS library VARY command to vary the tape library online and then reactivate the original SCDS. After OAM has restarted, run an OAM library audit command to ensure that the volumes are returned to their correct home cell locations before allocating to that library.

Chapter 5. Operating the OAM Address Space

This chapter helps you become familiar with operator commands and describes the common tasks needed to operate the OAM address space.

Overview of Operator Tasks

You can perform the following operator tasks:

- Start OAM
- Restart OAM
- Vary:
  - Tape library online and offline
  - Tape drive online and offline
- Eject a specific tape volume
- Audit a tape volume
- Import volumes into a virtual tape server library
- Export volumes from a virtual tape server library
- Disable Cartridge Entry Installation Exit processing
- Reenable installation exit processing
- Display the cartridge loader scratch media type for a tape drive
- Set the cartridge loader scratch media type for a tape drive or a range of tape drives
- Display the status of:
  - OAM
  - Tape library
  - Tape drive
  - Tape storage group
  - Tape volume
  - Outstanding OAM messages
- Stop OAM
- Capture Data for Diagnostic Purposes (OAM DUMP)
- Query OAM active and pending tape library requests (OAM QUERY)

Note: You may have an environment with multiple systems at different levels sharing a common TCDB. In this event, if a system attempts to perform an operator command against a volume that has a media or recording technology that is not recognized, the request fails.

Syntax Diagram Conventions

There is one basic rule for reading the syntax diagrams: Follow only one line at a time from the beginning to the end and code everything you encounter on that line.

The following rules apply to the conventions used in the syntax diagrams for all the OAM commands:

- Read the syntax diagrams from left to right and from top to bottom.
- Each syntax diagram begins with a double arrowhead (►►) and ends with opposing arrowheads (►◄).
- An arrow (→) at the end of a line indicates that the syntax continues on the next line. A continuation line also begins with an arrow (►–).

- Commands and keywords are shown in uppercase letters.
- Some commands and keywords have alternative abbreviations; these appear as part of the stack for that command or keyword. For example, the alternative abbreviation for **DISPLAY** is **D**.

```
►►──┬─DISPLAY─┬────────────────────────────────────────────►◄
    └─D───────┘
```

- Where you can choose from two or more keywords, the choices are stacked one above the other. If one choice within the stack lies on the main path, a keyword is required and you must choose one. In the following example you must choose either **DETAIL** or **STATUS**.

```
►►──┬─DETAIL─┬───────────────────────────────────────────────►◄
    └─STATUS─┘
```
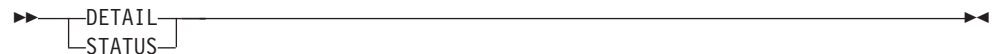
- If a stack is placed below the main path, a keyword is optional and you can choose one or none. In the following example, **PURGE**, **KEEP**, and **LOCATION** are optional keywords. You can choose any one of the three.

```
►►──┬──────────┬─────────────────────────────────────────────►◄
    ├─PURGE────┤
    ├─KEEP─────┤
    └─LOCATION─┘
```

- Where you can choose from two or more keywords and one of the keywords appears above the main path, that keyword is the default. You may choose one or the other of the keywords, but if none is entered, the default keyword is automatically selected. In the following example, you may choose either **DETAIL** or **STATUS**. If neither is chosen, **STATUS** is automatically selected.

```
      ┌─STATUS─┐
►►──┼─DETAIL─┼───────────────────────────────────────────────►◄
      └─STATUS─┘
```

- Words in all lowercase letters represent information *you* supply. For example, *volser* or *storgrp_name*.
- You must provide all items enclosed in parentheses ( ). You must include the parentheses.

  In the following example, you must supply the volume serial number (*volser*) and it must be enclosed in parentheses.

```
►►──┬─DISPLAY─┬──SMS,──┬─VOLUME─┬──(volser)───────────────────►◄
    └─D───────┘        └─VOL────┘
```
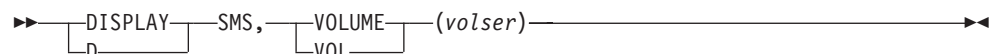
- The repeat symbol shown below indicates that you can specify keywords and variables more than once. The repeat symbol appears above the keywords and variables that can be repeated. When a comma appears in the repeat symbol, you must separate repeated keywords or variables with a comma.

In the following example you may specify one or more system identification numbers *system-id*, separated by commas, with the *library-name* and it all must be enclosed in parentheses.

```
►►─(library_name─────────────────────)─────────────────────────►◄
        │       ┌─,◄───────┐  │
        └─,─────▼──system_id─┘
```
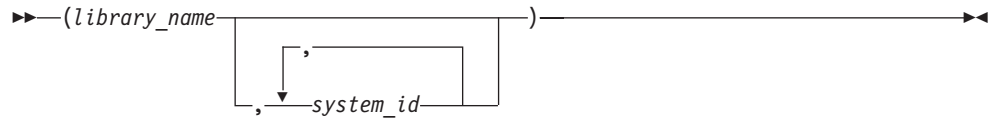
Message Format Conventions

The following conventions are used to show message format:

```
CBRnnnnX Message_text
```

where:

CBR   Standard OAM message prefix

nnnn   Four-digit message number

X   Type code:
  A   Action required
  D   Decision needed
  E   Eventual operator action required
  I   Information only

Message_text
       Text of the message.

Refer to *OS/390 MVS System Messages, Vol 2 (ASB-EZM)* for more information about messages.

The following is a sample of an OAM message:

```
CBR2601A  Specify shelf location for volume volser.
```

Note: In message text, italicized words indicate a value supplied by the system.

Starting OAM

To start the OAM address space manually or to restart the OAM address space after it has terminated, enter the MVS START command. The syntax of the MVS START command used to start OAM is as follows:

```
►►──┬─START─┬──┬─OAM──────┬──┬──────────────┬──────────────────►◄
    └─S─────┘  └─procname─┘  └─.identifier──┘
```
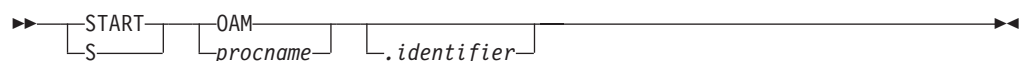
OAM
       Name of the IBM-supplied cataloged procedure that invokes OAM.

procname
>   Name of the user-written cataloged procedure that invokes OAM.

.identifier
>   User-determined name identifying the OAM address space. If you do not specify an identifier, the system automatically uses the *procname* as the identifier.

For further information on the MVS START command and additional parameters that can be specified, refer to *OS/390 MVS System Commands*.

When initializing OAM, the system issues the following messages:

```
CBR0001I  OAM initialization starting.

CBR0002I  OAM initialization completed.
```

If any other messages are issued, refer to *OS/390 MVS System Messages, Vol 2 (ASB-EZM)* for the appropriate action.

Varying a Tape Library Online or Offline

Use the VARY SMS command to vary libraries online or vary them offline. The syntax of the command to vary libraries is:
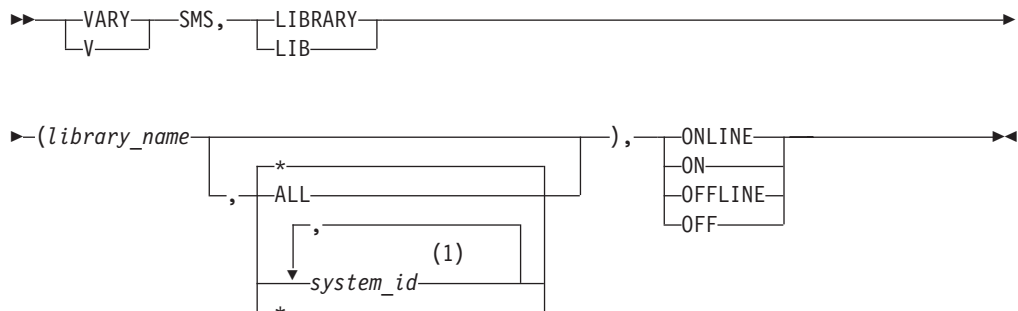
Notes:

1   Up to 8 *system_ids* may be specified (each must be separated by a comma).

OAM does not set the library offline until all the tape drives in the library are set offline. Such drives are considered offline for library reasons. When an individual drive is marked offline as a result of the **VARY ddd,OFFLINE** command, it is considered offline for *operator* reasons. Each offline state must be separately reset before the drive is again online. A **VARY SMS,LIB** command does not bring a drive online if the drive is currently offline for operator reasons. A **VARY ddd,ONLINE** command does not bring a drive online if the drive is currently offline for library reasons.

Note: A composite and distributed VTS library can be varied online and offline like any VTS library, though varying a distributed library offline from the host really has no meaning (does not prevent outboard usage of the library). Message CBR3016I is issued to warn the user when a distributed library is initialized or varied offline.

LIBRARY | LIB(*library_name***)**
>   Specifies the name of the library to be varied online or offline. If the name is not specified or the specified library is not defined in the SMS configuration, an error message is displayed.

ALL
>   Varies the state of the tape library on all systems in the SMS complex to which the library is connected.

* Varies the state of the tape library only on the system or system group from which the VARY command is issued. If the system or system group on which the VARY command is issued is not connected to the named library, an error message is displayed. This is the default.

system_id
>   Varies the state of the tape library only on the system(s) or system group(s) specified. If a specified system is not connected to the named tape library, an error message is displayed.

>   **Note:** To specify a system or system group named ALL, surround it with parentheses; for example, **VARY SMS,LIBRARY(***library_name***,(ALL)),ONLINE**.

ONLINE | ON
>   Specifies that the library be varied online.

OFFLINE | OFF
>   Specifies that the library be varied offline.

An example of the command to vary a tape library online is:

```
        VARY SMS,LIBRARY(ATL01),ONLINE
```

An example of the command to vary a tape library offline is:

```
        VARY SMS,LIBRARY(ATL01),OFFLINE
```

Restarting OAM

OAM provides the customer the ability to specify a RESTART option on the OAM started procedure statement (see the example under *Run SAMPLIB member CBRAPROC* on page 51). This option indicates that OAM should or should not be restarted upon notification that a new SCDS has been activated. A new or changed SCDS does not always affect the configuration information that OAM uses; therefore, a restart of the OAM address space may not always be necessary each time a new or changed SCDS is activated. This option provides a choice to the customer to decide on the most efficient use of their OAM resources.

If RESTART=YES is specified (the default), OAM restarts automatically once it is notified that an SCDS activation has occurred. OAM completes work that is currently on its execution queues, requeues any work from outside the OAM address space to the input work queue, and terminates any work from within the OAM address space not currently executing. OAM rebuilds its internal control blocks to match the SMS definitions in the recently activated SCDS. When OAM is back to full capacity (restart complete), the work requeued to the input work queue begins processing.

Note: How soon OAM is notified of the SCDS activation depends on the time interval specified with the INTERVAL keyword in the IGDSMSxx PARMLIB member.

If RESTART=NO is specified, OAM continues processing without rebuilding its internal control blocks when notified that an SCDS activation has occurred.

Message CBR0092I is issued to acknowledge that a NEW SCDS has been activated.

```
CBR0092I  New SMS Source Control Data Set activated.  OAM address space
          restart may be required.
```

It is the responsibility of the installation to ensure that the OAM RESTART command is issued if an OAM address space restart is necessary.

The OAM RESTART command causes OAM to restart the OAM address space. During restart processing, OAM matches the constructs and definitions used to those that are found in the active SMS configuration.

Through the issuance of this command, the operator can avoid having to perform STOP and START commands of the OAM address space, and it allows the OAM address space to retain its current ASID.

To restart the OAM address space without first stopping OAM, enter the following RESTART command:

```
►►──┬─MODIFY─┬──OAM──,──RESTART──────────────────────────────────────►◄
    └─F──────┘
```

Varying Tape Drives Online or Offline

Use the MVS VARY command to vary tape drives online or offline. Refer to *OS/390 MVS System Commands* for additional information on the MVS VARY command.

Ejecting a Specific Tape Volume

Use the MVS LIBRARY EJECT command to eject a specific tape volume from a tape library. When this command is issued for an ATLDS, the tape volume is placed into an output station of the tape library. For an MTLDS, no physical movement takes place as a result of this command. It is the responsibility of the operator to confirm the eject request at the library manager console and physically remove the cartridge from the storage racks associated with the library.

The syntax of the command to eject a specific tape volume is:

```
>>--+-LIBRARY-+--+-EJECT-+--,volser--+-------------------+--+-------------+-->< 
    +-LI------+  +-E-----+            +-,--+-PURGE----+---+  +-,--+-BULK-+--+
                                           +-P--------+        +-B----+
                                           +-KEEP-----+
                                           +-K--------+
                                           +-LOCATION-+
                                           +-L--------+
```
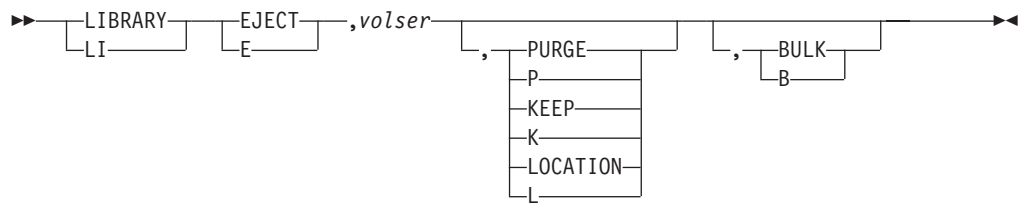
volser
> Specifies the volume serial number of the tape volume that is ejected from the tape library.

{PURGE | P | KEEP | K | LOCATION | L}
> Specifies the disposition of the volume record in the TCDB when a tape cartridge is ejected from the library. If neither PURGE, nor KEEP, nor LOCATION is specified, the disposition of the volume record in the TCDB is determined by the eject default entered on the ISMF Tape Library Define panel.

PURGE | P
> Specifies that the volume record in the TCDB be deleted upon completion of the EJECT operation.

KEEP | K
> Specifies that the volume record in the TCDB be retained upon completion of the EJECT operation.

LOCATION | L
> Specifies that the operator wants to update the shelf location associated with the tape volume. When LOCATION is specified, a write-to-operator-with-replay (WTOR) message is issued to the MVS operator prompting for 32 characters of shelf location information. The information entered by the operator is recorded in the shelf location field in the volume record in the TCDB. Specifying the LOCATION keyword implies that the volume record be retained upon completion of the EJECT operation.

{BULK | B}
> Specifies that the tape volume be placed in the high-capacity or "bulk" output station of the tape library. If neither BULK nor B is specified, the tape volume is placed in the convenience output station. If the high-capacity output station is not configured, the cartridge is ejected to the convenience station. If a convenience station is not installed in a 3494, the cartridge is placed in the single cell output area. (This parameter is ignored for volumes ejected from a MTLDS.)

To eject a tape cartridge from a tape library, enter the following command:

```
LIBRARY EJECT,TAP003
```

Auditing a Volume

OAM provides an AUDIT command that enables the system operator to audit a library resident tape volume.

The syntax of the command for the AUDIT function is:

```
►►──┬─MODIFY─┬──OAM,─AUDIT──,──┬─VOLUME, volser─────────────┬──────────────►◄
    └─F──────┘                 ├─VOLLIST, volser1,volser2...─┤
                               └─LIBRARY,library-name────────┘
```
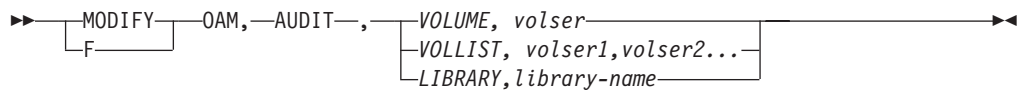
AUDIT
> Specifies a request to audit a single volume, list of volumes, or an entire tape library.

VOLUME | VOLLIST | LIBRARY
> Specifies the scope of the audit.

volser
> Specifies the volume serial number of the tape volume to be audited. If VOLLIST is specified, up to 15 tape volumes can be audited.

library-name
> Specifies the name of the tape library to be audited.

Specifying the Shelf Location

If the LOCATION operand is specified on the LIBRARY EJECT command, the system issues the following message and waits for a reply:

```
CBR2601A  Specify shelf location for volume volser.
```

Provide 1 to 32 characters of shelf location information.

The following message is issued to the operator when OAM accepts the EJECT command:

```
CBR1000I  OAM EJECT command execution scheduled.
```

One of the following messages is issued to the operator upon successful completion of the eject request:

```
CBR3010I  Volume volser ejected from library library-name.  Place in shelf
          location shelfloc.

                         or

CBR3011I  Secure checkpoint volume volser ejected from library library-name.
          Place in shelf location shelfloc.
```

If the ejected volume is reentered into a library before the eject completion message is processed, the following message is issued in place of CBR3010I or CBR3011I:

```
CBR3014I Eject processing completed for volume volser.  Reentry into library
         library-name detected.
```

The shelf location can be provided through:

- the LIBRARY EJECT command
- the Cartridge Entry Installation Exit (CBRUXENT)
- the Cartridge Eject Installation Exit (CBRUXEJC)
- the ISMF volume ALTER function

Note: *??????* is displayed in the eject completion messages if a shelf location has not been provided.

Importing Tape Volumes into a VTS

The LIBRARY IMPORT command is used to initiate or cancel an import operation at the library. Before an import operation can be initiated, the import list volume must be written to identify what volumes are to be imported. For more information, see "Importing Logical Volumes into a VTS Subsystem" on page 19.

The syntax of the command to import volumes into a VTS is:

```
►►─┬─LIBRARY─┬──┬─IMPORT─┬──,volser─┬────────────────────┬─►◄
   └─LI──────┘  └─IMP────┘          └─,─┬─CANCEL─┬────────┘
                                        └─C──────┘
```
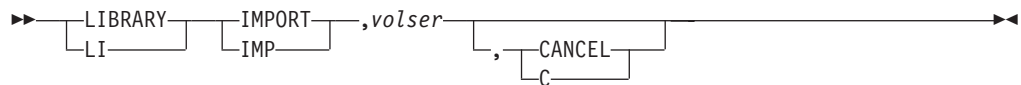
IMPORT | IMP
> Specifies a request to initiate (or cancel) the import of logical volumes into a VTS.

volser
> Specifies the volume serial number of the import list volume to be used for this import operation.

CANCEL | C
> This optional parameter requests that the currently executing import operation for the specified volume serial number be canceled.

Exporting Tape Volumes from a VTS

The LIBRARY EXPORT command is used to initiate or cancel an export operation at the library. Before an export operation can be initiated, the export list volume must be written to identify what volumes are to be exported. For more information, see "Exporting Logical Volumes from a VTS Subsystem" on page 27.

The syntax of the command to export volumes from a VTS is:

```
►►─┬─LIBRARY─┬──┬─EXPORT─┬──,volser─┬────────────────────┬─►◄
   └─LI──────┘  └─EXP────┘          └─,─┬─CANCEL─┬────────┘
                                        └─C──────┘
```
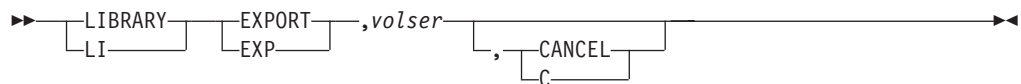
EXPORT | EXP
> Specifies a request to initiate (or cancel) the export of logical volumes from a VTS.

volser
> Specifies the volume serial number of the export list volume containing the list of volumes to be exported from the VTS.

CANCEL | C
> This optional parameter requests that the currently executing export operation for the specified volume serial number be canceled.

Disabling Cartridge Entry Installation Exit Processing

The LIBRARY DISABLE,*CBRUXENT* command provides the ability to disable cartridge entry processing for a particular system. This provides the ability to direct tape library cartridge entry processing to a particular system.

The syntax of the command to disable the cartridge entry exit processing is:

```
►►──┬─LIBRARY─┬──┬─DISABLE─┬──,─CBRUXENT──────────────────────────────────►◄
    └─LI──────┘  └─DA──────┘
```

DISABLE | DA
> Specifies a request to disable the installation exit.

CBRUXENT
> Specifies a request to disable cartridge entry installation exit processing. Cartridge entry processing does not occur on this system while the exit is disabled.

The following message is issued to the operator upon successful completion of the disable request:

```
CBR1951I  Installation exit CBRUXENT {WAS │ HAS BEEN } disabled by
          operator command.
```

The cartridge entry installation exit, CBRUXENT, is disabled. Cartridge entry processing on this system is disabled until a LIBRARY RESET command is issued or the system is IPLed. Restarting the OAM address space does not reenable cartridge entry installation exit processing if it has been disabled by an operator command.

Reenabling Installation Exit Processing

When OAM detects an error during installation exit processing, the function being performed when the exit was invoked is disabled. For example, cartridge entry, cartridge eject, private to scratch change use attribute, or volume not in library processing is not performed. An installation exit may also request, by way of a return code, that the exit not be invoked again; function processing continues without the exit. Also an operator, through the use of the MVS LIBRARY DISABLE command, may request that cartridge entry processing on a particular system be disabled. Use the MVS LIBRARY RESET command to reenable installation exit processing.

The syntax of the command to re-establish installation exit processing is:

```
►►──┬─LIBRARY─┬──┬─RESET─┬──,──┬─CBRUXEJC─────────────────────────────┬──►◄
     └─LI──────┘  └─R─────┘     ├─CBRUXENT─┤
                               ├─CBRUXCUA─┤
                               └─CBRUXVNL─┘
```
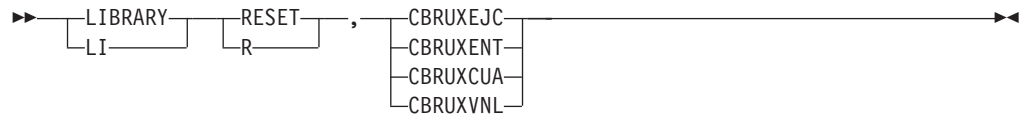
RESET | R
  Specifies a request to reactivate an installation exit.

CBRUXEJC | CBRUXENT | CBRUXCUA | CBRUXVNL
  Specifies which exit to reactivate.

CBRUXEJC
  Specifies that the cartridge eject installation exit (CBRUXEJC) be reactivated.

CBRUXENT
  Specifies that the cartridge entry installation exit (CBRUXENT) be reactivated.

CBRUXCUA
  Specifies that the change use attribute installation exit (CBRUXCUA) be reactivated.

CBRUXVNL
  Specifies that the volume not in library installation exit (CBRUXVNL) be reactivated.

Note: Resetting the CBRUXENT installation exit invokes cartridge entry processing for volumes in the insert category.

Displaying the Cartridge Loader Scratch Media Type

Use the MVS LIBRARY DISPCL command to display the media type of scratch volumes you want loaded into the cartridge loader of a library-resident tape drive. The syntax of the LIBRARY DISPCL command is:

```
►►──┬─LIBRARY─┬──┬─DISPCL─┬──,device_number────────────────────────────►◄
     └─LI──────┘  └─DC─────┘
```
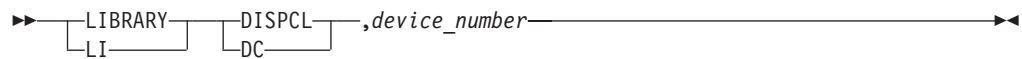
DISPCL | DC
  Specifies a request to display the media type of scratch volumes you want loaded into the cartridge loader for a library-resident tape drive.

device_number
  Specifies the MVS device number of a library-resident tape drive.

Note: The display output for the DISPCL command is the same as the output for the DISPDRV command for a single drive. See "Displaying Tape Drive Status" on page 89 for an example.

Setting the Cartridge Loader Scratch Media Type

Use the MVS LIBRARY SETCL command to set the media type of scratch volumes to be loaded into the cartridge loaders of library-resident tape drives. The syntax of the LIBRARY SETCL command is:

```
►►──┬─LIBRARY─┬──┬─SETCL─┬──,──┬─device_number─┬──,media_type────────────────►◄
    └─LI──────┘  └─SC────┘     └─device_range──┘
```

SETCL | SC
> Specifies a request to set the media type of scratch volumes to be loaded into the cartridge loader of library-resident tape drives.

device_number
> Specifies the MVS device number (*xxxx*).

device_range
> Specifies the MVS device range (*xxxx–yyyy*). The device number (*xxxx*) must be less than the device number (*yyyy*).

media_type
> Specifies the media type to be loaded.

> **MEDIA1**
>> Specifies IBM Cartridge System Tape.

> **MEDIA2**
>> Specifies IBM Enhanced Capacity Cartridge System Tape.

> **MEDIA3**
>> Specifies IBM High Performance Cartridge Tape.

> **MEDIA4**
>> Specifies IBM Expanded High Performance Cartridge Tape.

> **NONE**
>> No volumes are preloaded. The cartridge loader is emptied.

When you set a cartridge loader to a different media type than is currently loaded, the currently loaded cartridges are unloaded and stored away, and the cartridge loader is then loaded with the requested media type.

Note: This command should only be used for devices in a tape library dataserver that have cartridge loaders installed.

Assigning Categories to Cartridge Loaders

At the first IPL after the library is configured, media type defaults are no longer set for the cartridge loaders by the system so they remain set to NONE.

To set the media type, the LIBRARY SETCL command can be used to assign a media type to the tape library dataserver cartridge loaders. Once the LIBRARY SETCL command is used, the media type assigned to the cartridge loader is preserved. Subsequent IPLs will not modify the assignment. Use the LIBRARY DISPCL command to display the media type.

Media Selection

For nonspecific volume requests directed to a 3490E or 3590 device, the media type assigned to the cartridge loader is preferred if data class is not specified through the data class JCL parameter or through the ACS filter routines. If that scratch category is empty, the other media type is selected. However, if the category assigned to the cartridge loader is NONE, MEDIA2 is preferred for a 3490E and MEDIA4 is preferred for a 3590. If a specific media type is selected using data class, only that media type is used.

If a data set spans multiple volumes, the subsequent volumes are written using the media type of the last volume written. However, in the case of a 3490E or 3590 device, if the scratch category for that media type is empty, rather than fail the job, the other media type is used.

Displaying OAM Status

The syntax of the DISPLAY SMS,OAM command is:

```
►►─┬─DISPLAY─┬──SMS,OAM─────────────────────────────────────────►◄
   └─D───────┘        └─,L=─┬─a──────┐
                            ├─cc─────┤
                            ├─cca────┤
                            ├─name───┤
                            └─name-a─┘
```
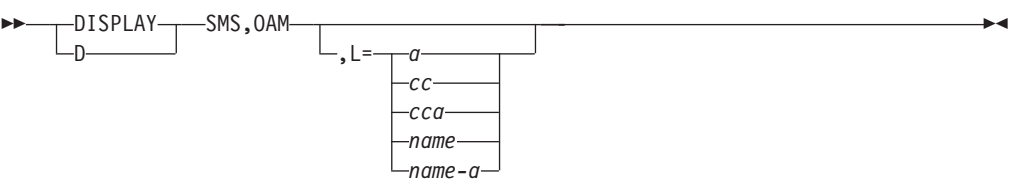
OAM
 Displays OAM status.

,L={a | cc | cca | name | name-a**}**
 Specifies where the results of the inquiry are to be displayed: the display area *a*, the console number *cc*, or both *cca*. The *name* parameter will be routed to the console referred to by *name* and the screen referred to by *a*. The *name* parameter can be an alphanumeric character string.

To display OAM status, enter the following command:

```
    DISPLAY SMS,OAM
```

The following information is displayed:

```
CBR1100I OAM status:
TAPE  TOT  ONL  TOT  TOT  TOT  TOT  TOT  ONL   AVL  TOTAL
      LIB  LIB  AL   VL   VCL  ML   DRV  DRV   DRV  SCRATCH
      nnn  ooo  ppp  qqq  rrr  sss  tttt uuuu  vvvv wwwwwww

exit-name PROCESSING (ENABLED | DISABLED | BYPASSED | OPERATOR DISABLED).
```

A display of the OAM address space status has been generated. If both optical and tape libraries have been defined in the SMS configuration, both optical and tape information would be generated in this display. For a sample of the CBR1100I message that includes optical information, refer to *OS/390 DFSMS OAM Planning, Installation, and Storage Administration Guide for Object Support*.

The fields in the data line specify the number of each tape library resource as follows:

nnn   Total number of tape libraries defined in the active SMS configuration (excluding the Peer-to-Peer Virtual Tape Server distributed libraries) that are connected to the current system (referred to in the following explanations as a connected tape library). The current system is the system on which the DISPLAY SMS,OAM command is entered. For the number of distributed libraries that are defined to the system, refer to the status line towards the bottom of the display.

ooo   Number of connected tape libraries that are online (excluding the Peer-to-Peer Virtual Tape Server distributed libraries).

ppp   Total number of connected automated tape library dataservers.

qqq   Number of connected Virtual Tape Servers (excluding the Peer-to-Peer VTSs).

rrr   Number of connected Peer-to-Peer Virtual Tape Server composite libraries.

sss   Number of connected manual tape library dataservers.

tttt   Total number of tape drives, known to the current system, residing in the connected tape libraries. Includes tape drives in both automated tape library dataservers, Virtual Tape Servers and manual tape library dataservers.

uuuu   Total number of tape drives, known to the current system and residing in the connected tape libraries, that are online and not allocated.

vvvv   Total number of tape drives, known to the current system and residing in the connected tape libraries, that are online and not allocated.

wwwwwww

Total number of scratch volumes of all media types in the connected tape libraries. This includes scratch volumes in the automated, manual, and virtual tape libraries.

If there are Peer-to-Peer VTS subsystems defined to the system, the following status line is displayed reflecting the number of distributed libraries that are associated with the composite libraries above:

There are also *numvdl-lib* **VTS distributed libraries defined.**

For OAM tape library installation exits, the following fields are displayed in the status messages:

exit-name

The name of the exit for which status is being displayed. This can be CBRUXENT, CBRUXEJC, CBRUXCUA, or CBRUXVNL. This line is repeated for each installation exit.

ENABLED

The exit is enabled and executes when the requested function is required.

DISABLED

The exit is disabled due to an error or an abend in the installation exit. For CBRUXCUA, the exit is disabled for CUA PRIVATE to SCRATCH requests only.

BYPASSED

The exit returned a return code 16 indicating that the request function is to continue without calling the exit for all other exits. For CBRUXVNL, either the exit returned a return code 16 indicating that it was not to be called again, or an error (or abend) occurred in the exit and the exit will not invoke.

OPERATOR DISABLED

For CBRUXENT, the operator has requested that cartridge entry processing be disabled by issuing the LIBRARY DISABLE,CBRUXENT command.

Cartridge entry processing can only be enabled by issuing a LIBRARY RESET,CBRUXENT command, or a system IPL.

The following is a sample of DISPLAY SMS,OAM status:

```
CBR1100I OAM status:
TAPE TOT  ONL TOT TOT TOT TOT TOT   ONL   AVL   TOTAL
     LIB  LIB  AL  VL VCL  ML DRV   DRV   DRV   SCRTCH
      8    7   3   2   3    0 368   355    78    1225
There are also 6 VTS distributed libraries defined.
CBRUXCUA PROCESSING ENABLED.
CBRUXEJC PROCESSING ENABLED.
CBRUXENT PROCESSING ENABLED.
CBRUXVNL PROCESSING ENABLED.
```

Note: If both optical libraries and tape libraries are defined in the SMS configuration, the optical library information is displayed first, followed by the tape library information.

Displaying Library Status

The syntax of the DISPLAY SMS command for library status is:
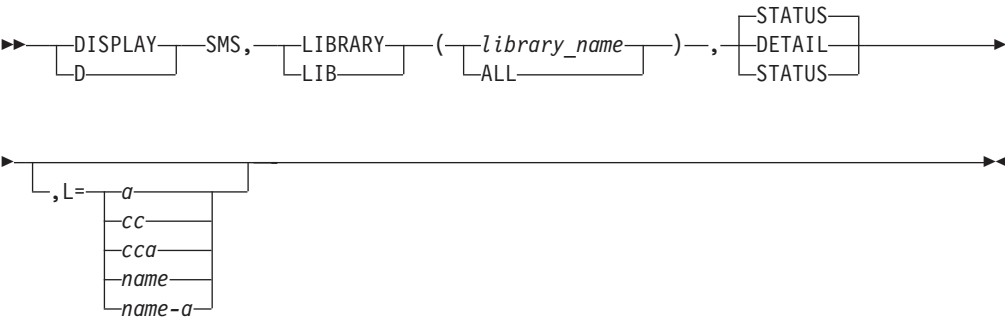
LIBRARY | LIB(library_name **| ALL)**
Identifies the library to be displayed. If a library name is specified, there is one data line describing the specified library. If ALL is specified, there is one data line for each library in the configuration. To specify a library named ALL, surround it with a double set of parentheses; for example: DISPLAY SMS,LIBRARY((ALL)).

STATUS | DETAIL
The STATUS keyword displays the online or offline state of each tape library in the SMS configuration with respect to each system in the SMS complex. STATUS is the default. The DETAIL keyword displays specific information about the library, such as total number of slots, empty slots, number of drives, scratch volumes, and so on.

,L={a **|** cc **|** cca **|** name **|** name-a**}**
Specifies where the results of the inquiry are to be displayed: the display area a, the console number cc, or both cca. The name parameter will be routed to the console referred to by name and the screen referred to by a. The name parameter can be an alphanumeric character string.

Displaying Library Connectivity

To display library connectivity for an individual library, enter the following command:

```
DISPLAY SMS,LIBRARY(library_name),STATUS
```

The following information is displayed:

```
IGD002I 11.19.56 DISPLAY SMS
                                    1 1 1 1 1 1 1
LIBRARY   CLASS     SYSTEM = 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
name      type               s s s s s s s s s s s s s s s s

                             1 1 1 2 2 2 2 2 2 2 2 2 3 3 3
LIBRARY   CLASS     SYSTEM = 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2
name      type               s s s s s s s s s s s s s s s s
```

The fields displayed in each data line are as follows:

name   Name of the library for which system connectivity and online or offline
        status is displayed on this line

type   Library type (tape or optical)

1–32   Numbers that appear after SYSTEM= indicate system IDs

s   Indicates the status of the drive:

  .   Not defined
  +   Online
  –   Offline
  P   Pending offline

If ALL and STATUS are specified with the LIBRARY keyword and both optical
libraries and tape libraries are defined in the SMS configuration, then the status is
combined in one display similar to the following.

The following is a sample of DISPLAY SMS,LIBRARY(ALL),STATUS:

```
D SMS,LIBRARY(ALL),STATUS
IGD002I 15:09:21 DISPLAY SMS 409
                                    1 1 1 1 1 1 1
LIBRARY   CLASS     SYSTEM=  1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
OPTLIB1   OPTICAL            + . . . . . . . . . . . . . . .
OPTLIB2   OPTICAL            + . . . . . . . . . . . . . . .
OPTLIB3   OPTICAL            + . . . . . . . . . . . . . . .
ATLLIB1   TAPE               + + + . . . . . . . . . . . . .
MTLA0001  TAPE               + - P . . . . . . . . . . . . .
MTLA0002  TAPE               + - P . . . . . . . . . . . . .
PCTREUSE  OPTICAL                        LIBRARY IS NOT A REAL LIBRARY
STDALONE  OPTICAL                        LIBRARY IS NOT A REAL LIBRARY

                                    1 1 1 2 2 2 2 2 2 2 2 2 3 3 3
LIBRARY   CLASS     SYSTEM=  7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2
OPTLIB1   OPTICAL            . . . . . . . . . . . . . . . .
OPTLIB2   OPTICAL            . . . . . . . . . . . . . . . .
OPTLIB3   OPTICAL            . . . . . . . . . . . . . . . .
ATLLIB1   TAPE               . + + . . . . . . . . . . . . .
MTLA0001  TAPE               + - P . . . . . . . . . . . . .
MTLA0002  TAPE               + - P . . . . . . . . . . . . .
PCTREUSE  OPTICAL                        LIBRARY IS NOT A REAL LIBRARY
STDALONE  OPTICAL                        LIBRARY IS NOT A REAL LIBRARY
**************************LEGEND*********************************
.   THE LIBRARY IS NOT DEFINED TO THE SYSTEM
+   THE LIBRARY IS ONLINE
-   THE LIBRARY IS OFFLINE
P   THE LIBRARY IS PENDING OFFLINE
P   THE LIBRARY IS PENDING OFFLINE
SYSTEM 1  = SYSTEM1    SYSTEM 2  = SYSTEM2    SYSTEM 3  = SYSTEM3
SYSTEM 4  = SYSTEM4    SYSTEM 5  = SYSTEM5    SYSTEM 6  = SYSTEM6
SYSTEM 7  = SYSTEM7    SYSTEM 8  = SYSTEM8    SYSTEM 9  = SYSTEM9
SYSTEM 10 = SYSTEM10   SYSTEM 11 = SYSTEM11   SYSTEM 12 = SYSTEM12
SYSTEM 13 = SYSTEM13   SYSTEM 14 = SYSTEM14   SYSTEM 15 = SYSTEM15
SYSTEM 16 = SYSTEM16   SYSTEM 17 = SYSTEM17   SYSTEM 18 = SYSTEM18
SYSTEM 19 = SYSTEM19   SYSTEM 20 = SYSTEM20   SYSTEM 21 = SYSTEM21
SYSTEM 22 = SYSTEM22   SYSTEM 23 = SYSTEM23   SYSTEM 24 = SYSTEM24
SYSTEM 25 = SYSTEM25   SYSTEM 26 = SYSTEM26   SYSTEM 27 = SYSTEM27
SYSTEM 28 = SYSTEM28   SYSTEM 29 = SYSTEM29   SYSTEM 30 = SYSTEM30
SYSTEM 31 = SYSTEM31   SYSTEM 32 = SYSTEM32
```

Displaying Library Detail Status

To display SMS,LIBRARY(ALL),DETAIL status enter the following command:

```
DISPLAY SMS,LIBRARY(ALL),DETAIL
```

The following information is displayed:

```
CBR1110I OAM library status:
TAPE     LIB   DEVICE   TOT  ONL   AVL  TOTAL   EMPTY   SCRTCH  ON  OP
LIBRARY  TYP   TYPE     DRV  DRV   DRV  SLOTS   SLOTS   VOLS
tlibname typ   tdevtype lll  mmm   nnn  oooooo  pppppp  qqqqqq  r   s
```

The fields in the data line are defined as follows:

tlibname
> The name of the tape library.

typ   The tape library type, as follows:
> **AL**   Automated tape library
> **ML**   Manual tape library
> **VL**   Virtual Tape Server
> **VCL**   Peer-to-Peer VTS Composite Library
> **VDL**   Peer-to-Peer VTS Distributed Library
> **UNK**   Software was unable to communicate with the tape library to obtain the tape library type.

tdevtyp
> The device type of the tape library.

> **3494-L10**
> > IBM 3494 TLDS Model L10

> **3495-L20**
> > IBM 3495 TLDS Model L20

> **3495-L30**
> > IBM 3495 TLDS Model L30

> **3495-L40**
> > IBM 3495 TLDS Model L40

> **3495-L50**
> > IBM 3495 TLDS Model L50

> **3495-M10**
> > IBM 3495 TLDS Model M10

lll   Total number of tape drives, known to the current system, residing in the tape library.

mmm   Total number of tape drives, known to the current system and residing in the tape library, that are online.

nnn   Total number of tape drives, known to the current system and residing in the tape library, that are online and not allocated.

oooooo
> Total number of storage slots in the tape library dataserver.

pppppp
> Total number of empty slots in the tape library dataserver.

qqqqqq
> Total number of scratch volumes of all media types in the tape library.

r   The tape library online status, as follows:

Y	Online	
N	Offline	
P	Pending offline	
s	The tape library operational status, as follows:	
Y	Operational	
N	Not operational	

If ALL and DETAIL are specified with the LIBRARY keyword and both optical libraries and tape libraries are defined in the SMS configuration, two messages are displayed. The first display contains optical library information. The second display contains the tape library information similar to that shown below.

The following is a sample of DISPLAY SMS,LIBRARY(ALL),DETAIL command where only tape libraries are defined:

```
CBR1110I OAM library status:
TAPE      LIB  DEVICE    TOT  ONL  AVL  TOTAL   EMPTY    SCRTCH  ON  OP
LIBRARY   TYP  TYPE      DRV  DRV  DRV  SLOTS   SLOTS     VOLS
ATL1000L  AL   3494-L10    6    6    6    621      12      234   Y   Y
ATL1001L  AL   3495-L50   64   52   12  13580    6459     5266   P   Y
MTL1002L  ML   3495-M10   16   10    6 100000   17423      243   Y   Y
ATL20003  VCL  3494-L10   64   60   48      0       0       19   Y   Y
ATL20004  VDL  3494-L10    0    0    0    416     223        0   Y   Y
ATL20005  VDL  3494-L10    0    0    0    416     253        0   Y   Y
VTSBA008  VL   3494-L10    4    4    4   1443      31      146   Y   Y
```

If a specific tape library is requested in the DISPLAY SMS,LIBRARY(*library_name*),DETAIL command, then additional information appears concerning the requested library:

```
-------------------------------------------------------------------------
MEDIA        SCRATCH       SCRATCH
TYPE          COUNT       THRESHOLD
MEDIA1
MEDIA2
MEDIA3
MEDIA4
-------------------------------------------------------------------------
DISTRIBUTED LIBRARIES:
COMPOSITE LIBRARY:
-------------------------------------------------------------------------
OPERATIONAL STATE:  {AUTOMATED|PAUSED|MANUAL MODE|MANAGED MANUAL MODE}
ERROR CATEGORY SCRATCH COUNT:
SCRATCH STACKED VOLUME COUNT:
PRIVATE STACKED VOLUME COUNT:
HIGH CAPACITY INPUT STATION CAPACITY:
HIGH CAPACITY OUTPUT STATION CAPACITY:
-------------------------------------------------------------------
   [statuslines]
```

Media type, scratch count, and scratch threshold lines are only displayed for media that have a threshold value or a scratch count greater than zero.

For a VTS composite or distributed library, the appropriate composite or distributed line will be displayed mapping their association.

The error category displays the total number of scratch volumes that have a software error associated with them. Scratch volumes in this category will still have a use attribute of scratch; however, they are not eligible to be mounted.

The scratch stacked volume count is only displayed for a virtual tape server (VTS) library and indicates the number of available physical scratch volumes. For a Peer-to-Peer VTS subsystem, this information can be obtained by displaying the distributed libraries associated with the composite library.

The private stacked volume count will only be displayed for a VTS library. This count indicates the number of physical stacked private volumes. For a Peer-to-Peer VTS subsystem, this information can be obtained by displaying the distributed libraries associated with the composite library.

For a VTS composite library, the operational state that is returned to the host is determined by examining the states of the underlying distributed libraries with much of the other status (for instance, I/O station-related status), being provided from the designated user interface (U/I) library. Also, since all of the drives and volumes are defined to and associated with the composite library, the display of a distributed library will show that, from a host perspective, there are no volumes and drives associated with that library. The distributed libraries should be displayed for an accurate picture of the total and empty slot counts (the slot counts associated with the composite library are zero).

The high capacity input and output station lines are only displayed for a 3494 or 3495 ATLDS and only if the station has been configured.

Possible status lines that may appear containing one or more of the following messages are:
- Operation degraded due to unavailable hardware resource
- Safety enclosure interlock open
- Vision system not operational
- Library manager offline
- Operator intervention required
- Library manager check 1 condition
- All storage slots full
- Out of cleaner volumes
- Dual write disabled
- Environmental alert
- Library manager switchover in progress
- Copy operations disabled
- VTS operations degraded
- Immediate Mode Copy operations deferred
- Service preparation ocurring
- All convenience input stations empty
- All convenience output stations empty
- All convenience output stations full
- Bulk output configured
- Bulk output not configured
- Bulk input/output configured
- Bulk input/output not configured
- High capacity output station full
- Input door open
- Output door open
- Convenience I/O station installed
- Convenience I/O station Input|Output|Import mode
- Convenience I/O station empty
- Convenience I/O station full
- Single cell output facility in use for eject
- Host initiated import in process

- Host initiated export in process
- Library initiated single volume import in process
- Library is out of empty stacked volumes
- Library has insufficient resources to continue mount processing

Displaying Tape Drive Status

Use the MVS LIBRARY DISPDRV command to display the status of any of the following combination of drives:
- All tape drives in a tape library
- A single tape drive
- A number of tape drives
- A range of tape drives

You can also use the MVS DISPLAY UNIT command, the MVS DEVSERV command or the JES3 *I,D command to display the status of tape drives within a tape library. Refer to *OS/390 MVS System Commands* for additional information on the specific MVS command.

The syntax of the LIBRARY DISPDRV command to display tape drive status is:

```
►►──┬─LIBRARY─┬──┬─DISPDRV─┬──,──┬─library_name───────────────────┬──────────►
    └─LI──────┘  └─DD──────┘     ├─device_number──────────────────┤
                                 ├─device_number,number_of_devices─┤
                                 └─device_number1-device_number2───┘

►──┬───────────────┬──────────────────────────────────────────────────────►◄
   └─,L=─┬─a──────┬─┘
         ├─cc─────┤
         ├─cca────┤
         ├─name───┤
         └─name-a─┘
```
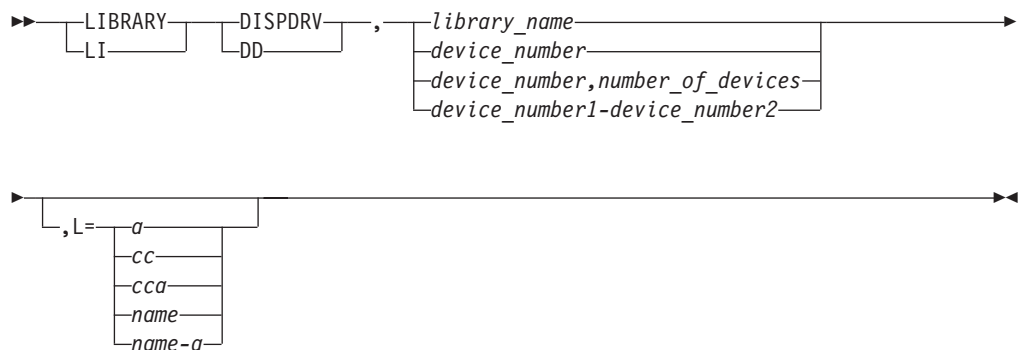
{DISPDRV | DD}
    Specifies a request to display tape drive status.

library_name
    Specifies the name of the tape library whose tape drives are to be displayed. However, the maximum number of tape drives displayed will not exceed 64.

device_number
    Specifies the MVS tape device number to be displayed.

number_of_devices
    Specifies the number of devices to be displayed. However, the maximum number of tape drives displayed will not exceed 64.

device_number1
    Specifies the first MVS tape device number to be displayed.

device_number2
    Specifies the last MVS tape device number to be displayed. However, the maximum number of tape drives displayed will not exceed 64.

,L={*a* | *cc* | *cca* | *name* | *name-a***}**
    Specifies where the results of the inquiry are to be displayed: the display area *a*, the console number *cc*, or both *cca*. The *name* parameter will be routed to

the console referred to by *name* and the screen referred to by *a*. The *name* parameter can be an alphanumeric character string.

To display tape drive status, enter the LIBRARY DISPDRV command.

The following information is displayed:

```
CBR1220I Tape drive status:
DRIVE    DEVICE  LIBRARY  ON   OFFREASN     LM   ICL      ICL   MOUNT
NUM      TYPE    NAME          LI  OP  PT   AV   CATEGRY  LOAD  VOLUME
devnum   devtyp  libname   b   c   d   e    f    ggggggg   h   mntvol
```

The fields in the data line are defined as follows:

devnum
> The tape device number.

devtyp Name of the tape device type as follows:

> **3480**   Reads and writes using 18-track recording technique on MEDIA1 cartridges. Not capable of compaction.
>
> **3480x**   Reads and writes using 18-track recording technique on MEDIA1 cartridges. Capable of compaction.
>
> **3490**   Reads 18-track and 36-track recording technique on MEDIA1 and MEDIA2 cartridges. Writes using 36-track recording technique on either MEDIA1 or MEDIA2 cartridges. Capable of compaction.
>
> **3590-1**   Reads and writes using 128-track recording technique on MEDIA3 or MEDIA4 cartridges. Capable of compaction.
>
> **3590-E**   Reads 128-track and 256-track recording technique on MEDIA3 and MEDIA4 cartridges. Writes using 256-track recording technique on either MEDIA3 or MEDIA4 cartridges. Capable of compaction. 3590-E is used in this display to represent the 3590-E1x family of 3590 tape devices and is not a system defined esoteric.
>
> **3400**   This is a 3400 magnetic tape drive.
>
> **UNKNOWN**   Tape device is not recognized.

> Whether a device defined through HCD is real or emulated is not determined until successful communication to the device has been made. Until successful communication has been made, the device type displayed will reflect the device type defined through HCD. Thus for emulated devices, such as the 3590 Model E, the device type displayed will reflect the emulated device type defined through HCD rather than the real underlying device type (3590-E). Once successful communication to the device has been established, the device type displayed will reflect the real underlying device type.

> Also, on system levels that support the emulated device type defined through HCD, but do not support the real underlying device type (such as the 3590 Model E), the device type displayed will reflect the emulated device type defined through HCD.

libname
> Name of the library in which the tape drive resides. For a stand-alone tape drive (nonlibrary resident drive), this field contains '--N/A--'.

b   Tape drive status.
> **Y**   Online.
> **N**   Offline.

Note: A device can be offline with none of the reason indicators below being set. For example, if a device goes through IOS recovery and the device ends up getting boxed, the reason indicator may not be set.

c Tape drive is offline for library reasons:

Y The library in which the tape drive resides is offline.

N The library in which the tape drive resides is online.

— The library does not reside in a tape library.

d Tape drive is offline for operator reasons:

Y The operator has varied the tape drive offline, or the device is defined offline at initialization.

N The operator has varied the tape drive online.

e Tape drive is offline for path reasons:

Y All channel paths to the tape drive are offline.

N At least one channel path to the drive is online.

f Library Manager device availability status:

A The tape drive is available at the Library Manager.

U The tape drive is unavailable at the Library Manager.

— The tape drive does not reside in a tape library or the library manager drive availability status is unknown.

ggggggg
Cartridge loader scratch media category:

MEDIA1
The cartridge loader of the tape drive is set to load with MEDIA1 scratch tapes if available.

MEDIA2
The cartridge loader of the tape drive is set to load with MEDIA2 scratch tapes if available.

MEDIA3
The cartridge loader of the tape drive is set to load with MEDIA3 scratch tapes if available.

MEDIA4
The cartridge loader of the tape drive is set to load with MEDIA4 scratch tapes if available.

X'xxxx'
The hexadecimal value of the assigned category is not recognized by this system.

NONE No category is assigned to the cartridge loader. No scratch tape is loaded.

--N/A--
This is not library-resident tape drive.

h Volume loaded in the cartridge loader.

Y At least one volume has been loaded in the cartridge loader.

N No volume has been loaded in the cartridge loader.

— The tape drive does not reside in a tape library.

mntvol Volume serial number of the volume which is currently mounted on the tape drive. If there is no mounted volume, this field is blank.

Additional information may appear containing one or more of the following messages:
- Starting device number is not a tape device.
- Number of tape devices requested exceeds 64; 64 displayed.
- Number of tape devices requested exceeds the number available.
- No tape devices within display criteria.

The following is a sample display of LIBRARY DISPDRV,(*library_name*) command:

```
CBR1220I Tape drive status:
DRIVE  DEVICE   LIBRARY ON  OFFREASN  LM  ICL      ICL   MOUNT
NUM    TYPE     NAME        LI OP PT  AV  CATEGRY  LOAD  VOLUME
0FC0   3490     ATLF4017 Y  N  N  N   A   NONE      N    TST211
0FC1   3490     ATLF4017 N  N  Y  N   A   NONE      N
0FD0   3590-E   ATLF4017 Y  N  N  N   A   NONE      N    TST256
0FD1   3590-E   ATLF4017 Y  N  N  N   A   NONE      N
0FD2   3590-E   ATLF4017 Y  N  N  N   A   NONE      N
0FD3   3590-E   ATLF4017 Y  N  N  N   A   NONE      N
0FE0   3590-1   ATLF4017 Y  N  N  N   A   NONE      N    TST500
0FE1   3590-1   ATLF4017 Y  N  N  N   A   NONE      N
0FE2   3590-1   ATLF4017 Y  N  N  N   A   NONE      N
0FE3   3590-1   ATLF4017 Y  N  N  N   A   NONE      N
```

Displaying Storage Group Status

The syntax of the DISPLAY command to display storage group status is:
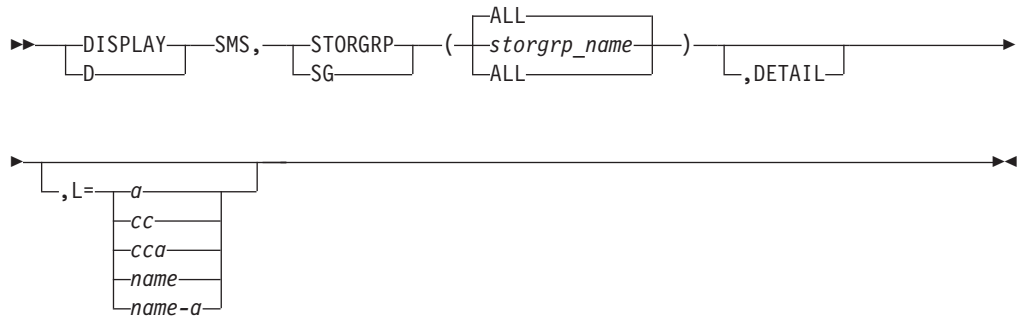
STORGRP | SG(storgrp_name **|** ALL**)**
>   If *storgrp_name* is specified, the status of the requested tape storage group is
>   displayed. If *storgrp_name* is omitted, then *ALL* is the default and the status of
>   all storage groups within the active configuration is displayed.

,DETAIL
>   Displays the tape libraries associated with the tape storage groups.

,L={a **|** cc **|** cca **|** name **|** name-a**}**
>   Specifies where the results of the inquiry are to be displayed: the display area
>   *a*, the console number *cc*, or both *cca*. The *name* parameter will be routed to
>   the console referred to by *name* and the screen referred to by *a*. The *name*
>   parameter can be an alphanumeric character string.

To display status for an individual storage group, enter the following command:

```
        DISPLAY SMS,STORGRP(storgrp_name),DETAIL
```

The following information is displayed:

```
CBR1130I OAM storage group status:
TAPE     LIBRARY
STORGRP  NAMES
sgname   libname1 libname2 libname3 libname4
         libname5 libname6 libname7 libname8
```

The fields displayed in each data line are as follows:

sgname
> Name of the tape storage group

libname1
> Names of the one to eight tape libraries associated with the storage group

The following is sample output of the DISPLAY SMS,STORGRP(ALL),DETAIL command:

```
CBR1130I OAM storage group status:
TAPE     LIBRARY
STORGRP  NAMES
TAPESG1  TAPELIB1
TAPESG2  TAPELIB1  TAPELIB2
TAPESG3  TAPELIB1  TAPELIB2  TAPELIB3
```

If ALL and DETAIL are specified with the STORGRP keyword and both object storage groups and tape storage groups are defined in the SMS configuration, object storage group information is displayed first followed by the tape storage group information similar to that shown in the sample above.

If ALL is specified but DETAIL is *not* specified with the STORGRP keyword and both object storage groups and tape storage groups are defined in the SMS configuration, then the status is combined in one display similar to that shown below.

The following is sample output from the DISPLAY SMS,STORGRP(ALL) command:

```
IGD002I   11.19.56   DISPLAY SMS
                                      1 1 1 1 1 1 1
STORGRP    TYPE       SYSTEM= 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
BACKUP01   OBJECTB           + . . . . . . . . . . . . . . .
OBJSG01    OBJECT            + . . . . . . . . . . . . . . .
OBJSG02    OBJECT            + . . . . . . . . . . . . . . .
OBJSG03    OBJECT            + . . . . . . . . . . . . . . .
TAPESG1    TAPE             + + + . . . . . . . . . . . . . .
TAPESG2    TAPE             . + + . . . . . . . . . . . . . .
TAPESG3    TAPE             . - D . . . . . . . . . . . . . .
TSODASD    POOL             + + + + + - - + . . . . . . . . .

                                      1 1 1 2 2 2 2 2 2 2 2 3 3 3
STORGRP    TYPE       SYSTEM= 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2
BACKUP01   OBJECTB           . . . . . . . . . . . . . . . .
OBJSG01    OBJECT            . . . . . . . . . . . . . . . .
OBJSG02    OBJECT            . . . . . . . . . . . . . . . .
OBJSG03    OBJECT            . . . . . . . . . . . . . . . .
TAPESG1    TAPE             + + + . . . . . . . . . . . . . .
TAPESG2    TAPE             . + + . . . . . . . . . . . . . .
TAPESG3    TAPE             . - D . . . . . . . . . . . . . .
TSODASD    POOL             + + + + + - - + . . . . . . . . .
***************************LEGEND********************************
.   THE STORAGE GROUP OR VOLUME IS NOT DEFINED TO THE SYSTEM
+   THE STORAGE GROUP OR VOLUME IS ENABLED
-   THE STORAGE GROUP OR VOLUME IS DISABLED
*   THE STORAGE GROUP OR VOLUME IS QUIESCED
D   THE STORAGE GROUP OR VOLUME IS DISABLED FOR NEW ALLOCATIONS ONLY
Q   THE STORAGE GROUP OR VOLUME IS QUIESCED FOR NEW ALLOCATIONS ONLY
SYSTEM 1  = SYSTEM1      SYSTEM 2  = SYSTEM2      SYSTEM 3  = SYSTEM3
SYSTEM 4  = SYSTEM4      SYSTEM 5  = SYSTEM5      SYSTEM 6  = SYSTEM6
SYSTEM 7  = SYSTEM7      SYSTEM 8  = SYSTEM8      SYSTEM 9  = SYSTEM9
SYSTEM 10 = SYSTEM10     SYSTEM 11 = SYSTEM11     SYSTEM 12 = SYSTEM12
SYSTEM 13 = SYSTEM13     SYSTEM 14 = SYSTEM14     SYSTEM 15 = SYSTEM15
SYSTEM 16 = SYSTEM16     SYSTEM 17 = SYSTEM17     SYSTEM 18 = SYSTEM18
SYSTEM 19 = SYSTEM19     SYSTEM 20 = SYSTEM20     SYSTEM 21 = SYSTEM21
SYSTEM 22 = SYSTEM22     SYSTEM 23 = SYSTEM23     SYSTEM 24 = SYSTEM24
SYSTEM 25 = SYSTEM25     SYSTEM 26 = SYSTEM26     SYSTEM 27 = SYSTEM27
SYSTEM 28 = SYSTEM28     SYSTEM 29 = SYSTEM29     SYSTEM 30 = SYSTEM30
SYSTEM 31 = SYSTEM31     SYSTEM 32 = SYSTEM32
```

Displaying Tape Volume Status

The syntax of the DISPLAY command to display tape volume status is:

```
>>--+--DISPLAY--+--SMS,--+--VOLUME--+--(volser)--+-----------------+-->< 
    '--D-------'         '--VOL-----'            '-,L=-+--a------+-'
                                                       +--cc-----+
                                                       +--cca----+
                                                       +--name---+
                                                       '--name-a-'
```
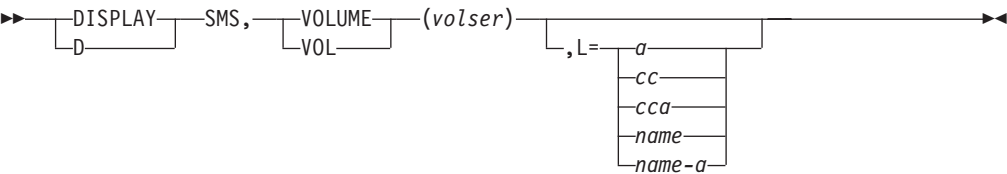
VOLUME | VOL(volser**)**
> Displays the status of the requested tape volume. There is no option to display all tape volumes known to the system; however, you may use ISMF panels to display a list of tape volumes.
>
> Specifying volser displays the status of the requested tape volume.

,L={a **|** cc **|** cca **|** name **|** name-a**}**
> Specifies where the results of the inquiry are to be displayed: the display area a, the console number cc, or both cca. The name parameter will be routed to

the console referred to by *name* and the screen referred to by *a*. The *name* parameter can be an alphanumeric character string.

To display tape volume status, enter the following command:

```
DISPLAY SMS,VOLUME(volser)
```

The following information is displayed:

```
CBR1180I OAM tape volume status:
VOLUME     MEDIA      STORAGE    LIBRARY    USE  W   C   SOFTWARE  LIBRARY
           TYPE       GROUP      NAME       ATR  P   P   ERR STAT  CATEGORY
volser     medtype    sgname     libname    u    x   y   errstat   category
RECORDING TECH:        aaaaaaaaaa
COMPACTION:            bbbbbbbbbb
SPECIAL ATTRIBUTE:     cccccccccc
CREATION DATE:         dddddddddd    EXPIRATION DATE:    eeeeeeeeee
LAST MOUNTED DATE:     ffffffffff    LAST WRITTEN DATE:  gggggggggg
ENTER/EJECT DATE:      hhhhhhhhhh
SHELF LOCATION:        shelfloc
OWNER:  owner information
status lines
```

The fields displayed in each data line are as follows:

volser Volume serial number of the requested tape volume.

medtype
: Media type of the tape volume, as follows:

MEDIA1	IBM Cartridge System Tape
MEDIA2	IBM Enhanced Capacity Cartridge System Tape
MEDIA3	IBM High Performance Cartridge Tape
MEDIA4	IBM Extended High Performance Cartridge Tape
UNKNOWN	No media type specified
INVALID	Media type specified is not valid

sgname
: Name of the storage group to which the tape volume belongs.

libname
: Name of the library in which the tape volume resides. If the volume resides outside a library, this field contains SHELF.

u Tape volume use attribute, as follows:

P	Private use attribute
S	Scratch use attribute

x Tape volume write protection status, as follows:

Y	Write protected
N	Not write protected
blank	Write protection status unknown

y Tape volume checkpoint status, as follows:

Y	Secure checkpoint volume
N	Not a secure checkpoint volume
blank	Checkpoint status unknown

errstat The software recorded volume error status, as follows:

ANSILAB
: ANSI label not supported.

CHECKPT
: Attempt to access secure checkpoint volume.

DAMAGED
: Cartridge is physically damaged and leader block may be missing.

DUPMOUNT

Volume with same *volser* already mounted.

EXTLABEL

External label missing or unreadable.

INACCESS

Volume inaccessible in library.

INTLABEL

Volume label cannot be read.

LABTYPE

Invalid volume label type, neither standard nor ANSI.

LNGTHERR

Cartridge length exceeds IBM supported maximum.

MEDIAMNT

Mounted media does not match the type specified for a scratch volume mount request.

MED2MNT

MEDIA2 cartridge mounted on a nonMEDIA2 capable device.

MISSING

Volume not in assigned location in library.

NOERROR

No errors detected.

NOMATCH

Internal and external labels do not match.

NOTINLIB

Volume not in library manager inventory.

PASSPROT

Attempt to access password-protected volume.

RACFPROT

Attempt to access SAF/RACF-protected volume.

REJTMS

Volume rejected by the tape management system.

REJUSER

Volume rejected by the user's DCB exit or label editing routine.

TRKCMPAT

Media was mounted whose recording technology is incompatible with the device.

UNEXPIR

Attempt to write over unexpired data.

UNFORMAT

Volume has not been formatted with servo tracks and should be returned to the media manufacturer.

UNKNOWN

Volume error status unknown.

WRITPROT

Attempt to write on write-protected volume.

WRONGVOL

Library mounted different volume when this volume was requested.

category

Library category to which the volume is assigned, as follows:

BULKEJCT

Volume is to be ejected to the bulk output station.

CONVEJCT

Volume is to be ejected to a convenience output station.

ERROR

An error has been detected by software during an attempt to mount this scratch volume.

EXPORTED

The logical volume has been exported onto a stacked volume, but export completion processing has not occurred at the host.

EXPPEND

The export of the logical volume is pending in the libary.

INSERT

Volume has been put into the library, but has not yet been processed by software cartridge entry.

MANEJECT

Volume has been manually removed from the library. Volumes in this category are not processed by the host and remain in this category.

NONE Volume resides outside of a tape library.

NOTAVAIL

OAM display processor was unable to obtain the volume data record from the tape library.

PRIVATE

Volume contains useful data and may be requested only by specific *volser* reference.

SCRMED1

Volume contains no useful data and may be requested only by nonspecific *volser* reference. The volume resides in the library category for scratch volumes of media type MEDIA1.

SCRMED2

Volume contains no useful data and may be requested only by nonspecific *volser* reference. The volume resides in the library category for scratch volumes of media type MEDIA2.

SCRMED3

Volume contains no useful data and may be requested only by nonspecific *volser* reference. The volume resides in the library manager category for scratch volumes of media type MEDIA3.

SCRMED4

Volume contains no useful data and may be requested only by nonspecific *volser* reference. The volume resides in the library manager category for scratch volumes of media type MEDIA4.

UNKNOWN

Hardware category is not recognized by software.

aaaaaaaaaa

Recording technology used to record the tape:

18 TRACK

18-track recording mode

36 TRACK

36-track recording mode

128 TRACK

128-track recording mode

256 TRACK

256-track recording mode

UNKNOWN

Recording mode not specified

INVALID

Recording technology specified is invalid

bbbbbbbbbb

Compaction mode set during recording:

YES Compaction

NO No compaction

UNKNOWN

Compaction not specified

INVALID

Compaction specified is invalid

cccccccccc

Volume special attribute:

RDCOMPAT

Volume used for read-only. All read-compatible devices are eligible.

NONE   Volume has no special attribute.

INVALID

Special attribute specified is invalid.

dddddddddd

Date the volume record in the TCDB catalog was initially created, in ISO date format YYYY-MM-DD.

eeeeeeeeee

Expiration date of the tape volume, in ISO date format YYYY-MM-DD.

ffffffffff   Date the volume was last mounted, in ISO date format YYYY-MM-DD.

gggggggggg

Date a data set was last opened for output on the volume, in ISO date format YYYY-MM-DD.

hhhhhhhhhh

Date the volume was last entered into or ejected from a tape library, in ISO date format YYYY-MM-DD.

shelfloc

Shelf location where the tape volume is stored if the volume resides outside a library; otherwise, this is the shelf location where the volume is stored when it is ejected from the library.

owner information

Owner information associated with the tape volume.

status lines

Additional tape volume status messages, as follows:
- Audit operation queued in host
- Audit operation queued in library
- Audit operation in progress in library
- Eject operation queued in host
- Eject/Export operation queued in library
- Eject/Export operation in progress in library
- Mount operation queued in library
- Mount operation in progress in library
- Volume mounted on library-resident drive
- Demount operation queued in library
- Demount operation in progress in library
- Volume inaccessible in library
- Volume misplaced in library
- External label missing or unreadable
- Volume used during manual mode
- Logical volume
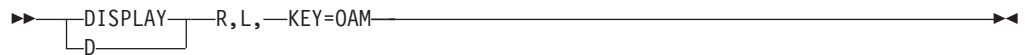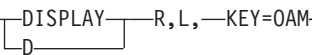
The following is sample output of the DISPLAY SMS,VOLUME(*volser*) command:

```
CBR1180I OAM tape volume status:
VOLUME MEDIA   STORAGE LIBRARY  USE  W  C  SOFTWARE  LIBRARY
       TYPE    GROUP   NAME     ATR  P  P  ERR STAT  CATEGORY
J00001 MEDIA2  TAPESG2 VTSLIB1  P    N  N  NOERROR   EXPORTED
-----------------------------------------------------------------
RECORDING TECH:    36 TRACK
COMPACTION:        NO
SPECIAL ATTRIBUTE: NONE
CREATION DATE:     1991-11-01   EXPIRATION DATE:   1999-12-31
LAST MOUNTED DATE: 1992-01-15   LAST WRITTEN DATE: 1992-01-15
ENTER/EJECT DATE:  1991-11-01
SHELF LOCATION:
OWNER: E. M. WHALEN, 031/2276, IBM CORPORATION, TUCSON, AZ
-----------------------------------------------------------------
Eject/Export operation in progress in library.
Logical volume.
```

Displaying Outstanding OAM Messages

The syntax of the DISPLAY command to display outstanding OAM messages is:

```
►►─┬─DISPLAY─┬──R,L,──KEY=OAM──────────────────────────────────────────►◄
   └─D───────┘
```
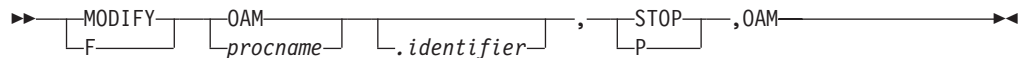
To display outstanding OAM messages, enter the following command:

```
    DISPLAY R,L,KEY=OAM
```
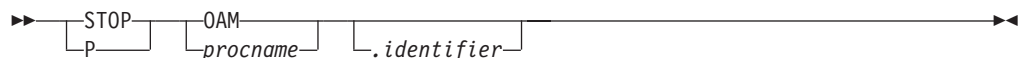
Use this command to display the message identification numbers and texts of all immediate action messages, eventual action messages, and messages waiting for replies that OAM issued.

Stopping OAM

The syntax of F OAM,STOP command to stop OAM is:

```
►►─┬─MODIFY─┬──┬─OAM──────┬──┬──────────────┬──,──┬─STOP─┬──,OAM───────────►◄
   └─F──────┘  └─procname─┘  └─.identifier──┘     └─P────┘
```

The syntax of the STOP OAM command to stop OAM is:

```
►►─┬─STOP─┬──┬─OAM──────┬──┬──────────────┬──────────────────────────────►◄
   └─P────┘  └─procname─┘  └─.identifier──┘
```

To stop OAM, enter the following command:

```
    F OAM,STOP,OAM
```

The system displays the following messages indicating OAM termination status.

```
CBR0098I  OAM termination starting.

CBR1000I  OAM STOP command execution scheduled.

CBR0099I  OAM termination completed.
```

Capturing OAM Diagnostic Data

OAM uses SVC dumps as a diagnostic tool for system hangs or performance problems. To capture this data, the operator issues the DUMP command after the problem has been recreated or at the time of failure. OAM provides a streamlined version of the previous DUMP command. The F OAM,DUMP,(*operands*) command automatically collects all the pertinent data needed for diagnostic purposes without the operator having to key in all the correct parameters.

The syntax of the F OAM,DUMP command is:
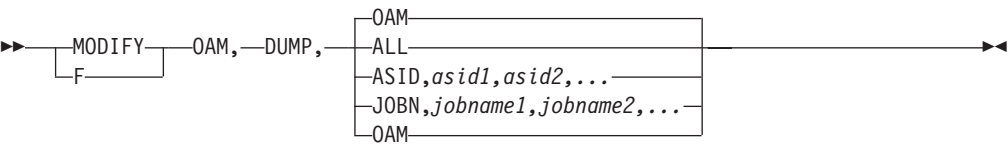
```
►►──┬─MODIFY─┬──OAM,──DUMP,──┬─OAM───────────────────────┬──────────────►◄
    └─F──────┘               ├─ALL───────────────────────┤
                             ├─ASID,asid1,asid2,...──────┤
                             ├─JOBN,jobname1,jobname2,...─┤
                             └─OAM───────────────────────┘
```

Note: OAM is the default name of the cataloged procedure in your SYS1.PROCLIB. If a name other than OAM is used for the cataloged procedure, use that name in the DUMP statement. For example, MODIFY *procname_name*,DUMP,OAM.

OAM
Specifies a request to schedule an SVC dump for the OAM address space. If the first operand after the DUMP verb is either OAM or blank, OAM schedules an SVC dump for the OAM address space.

ALL
An SVC dump is scheduled for the OAM address space and any address spaces which currently have work queued to the OAM address space, up to 14 address spaces in addition to OAM.

If the first operand after the DUMP verb is ALL, OAM scans all queues to identify address spaces that are not the OAM address space. OAM scans until all queues are searched or 14 address spaces are found. OAM then schedules an SVC dump for the OAM address space and up to 14 other address spaces that currently have work queued in the OAM address space.

ASID (address space identifier),*asid1,asid2,asid3...*
An SVC dump is scheduled for the OAM address space and any address spaces specified after the ASID operand separated by commas. A valid ASID is a 1 to 4 hexadecimal (0–9, A—F) value. From one to 14 ASIDs can be specified with the ASID operand. If more than 14 ASIDs are specified, the first 14 will be used.

If the first operand after the DUMP verb is ASID, OAM validates that any ASIDs specified following the ASID operand are valid hexadecimal characters (0–9,

A—F). If they are valid, OAM, schedules an SVC dump for the OAM address space and any additional address spaces specified (up to 14 address spaces in addition to OAM).

JOBN (job name),*jobname1,jobname2,jobname3...*
An SVC dump is scheduled for the OAM address space and any job spaces specified after the JOBN operand separated by commas. A valid job name is a 1 to 8 character value of the following character set:
- Alphanumeric characters (A—Z, 0–9)
- National characters (&, $, @)
- Wildcard characters (*, ?) where '*' can stand for 0 or more characters, up to the maximum length of the job name string (8) and '?' can stand for one character.

From 1 to 14 job names can be specified with the JOBN operand. If more than 14 job names are specified, the first 14 will be used.

If the first operand after the DUMP verb is JOBN, OAM validates that any job names specified following the JOBN operand contain the valid character set. If they are valid, OAM schedules an SVC dump for the OAM address space and any job names specified (up to 14 jobs in addition to OAM).

OAM issues messages for any errors found in the DUMP command at SVC scheduling time and at SVC DUMP data capture completion. For more information concerning these messages, refer to *OS/390 MVS System Messages, Vol 2 (ASB-EZM)*.

Querying Active and Waiting OAM Tape Library Requests

OAM provides a QUERY command that enables the system operator to query the status of active and waiting requests processed in the OAM address space. This includes and is limited to tape library eject, enter, and audit requests. The command is capable of displaying:
- Summary of active tape library requests
- Summary of waiting tape library requests
- Detailed information concerning active tape library requests
- Detailed information concerning waiting tape library requests

Note: This publication deals only with the information regarding active and waiting tape library requests. For information on how this command is used in conjunction with optical and object tape requests, refer to *OS/390 DFSMS OAM Planning, Installation, and Storage Administration Guide for Object Support*.

The syntax of the F OAM,QUERY command is:
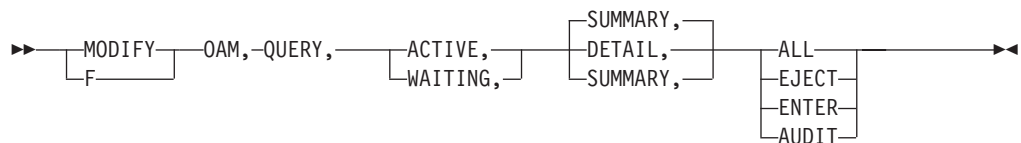
```
                                                      ┌─SUMMARY,─┐
►►──┬─MODIFY─┬──OAM,─QUERY,──┬─ACTIVE,──┬──┼─DETAIL,──┼──┬─ALL───┬──►◄
    └─F──────┘               └─WAITING,─┘  └─SUMMARY,─┘  ├─EJECT─┤
                                                         ├─ENTER─┤
                                                         └─AUDIT─┘
```

Note: OAM is the default name of the cataloged procedure in your SYS1.PROCLIB. If a name other than OAM is used for the cataloged

procedure, use that name in the QUERY statement. For example, MODIFY *procname_name*,QUERY,ACTIVE,SUMMARY.

The following are the keyword descriptions of the QUERY command:

QUERY | Q
Specifies a request to display information about active and waiting tape library requests.

ACTIVE | A | WAITING | W
Specifies whether information about active or waiting requests will be displayed. One of these keywords must be specified on the QUERY command.

> **ACTIVE | A**
> Specifies that only information about active requests, those currently being processed, will be displayed.
>
> **WAITING | W**
> Specifies that only information about requests waiting for processing will be displayed.

SUMMARY | S | DETAIL | D
Specifies whether summary or detailed information should be displayed for the requested category (ACTIVE or WAITING). If neither the SUMMARY nor DETAIL keyword is specified on the QUERY command, then only summary information is displayed for the requested category.

> **SUMMARY | S**
> Specifies that only summary information about the requested category should display. This is the default.
>
> **DETAIL | D**
> Indicates that only detailed information about the requested category is to be displayed. When the DETAIL keyword is specified, one of the following keywords is required:
>
> > **ALL**
> > Detail information for all eject, entry, and audit requests (active or waiting) are displayed.
> >
> > **EJECT**
> > Detail information for all tape library EJECT requests (active or waiting) are displayed.
> >
> > **ENTER**
> > Detail information for all tape library ENTER requests (active or waiting) are displayed.
> >
> > **AUDIT**
> > Detail information for all tape library AUDIT requests (active or waiting) are displayed.

To display summary information on active tape library requests, enter one of the following commands:

```
F OAM,QUERY,ACTIVE

      or

F OAM,QUERY,ACTIVE,SUMMARY
```

The following information is displayed:

```
CBR1735I TAPE LIBRARY ACTIVE SUM:
    ---- TAPE LIBRARY REQUESTS CURRENTLY BEING PROCESSED----
    ENTERS   EJECTS   AUDITS
    aaaaaa   bbbbbb   cccccc
```

The fields in the data line are defined as follows:

aaaaaa
> Total number of tape volume entry requests currently processing. Only one tape volume entry request can be active per library.

bbbbbb
> Total number of user initiated tape volume eject requests currently processing, queued, or both, at the library manager. Physically ejected volumes from the library can still appear in this total if OAM has not processed the eject completion message.

cccccc Total number of tape volume audit requests currently processing, queued, or both, at the library manager.

Note: All counts are a snapshot-in-time, so the counts can quickly change.

To display summary information on waiting tape library requests, enter one of the following commands:

```
    F OAM,QUERY,WAITING

                    or

    F OAM,QUERY,WAITING,SUMMARY
```

The following information is displayed:

```
CBR1715I TAPE LIBRARY WAITING SUM:
    ---- TAPE LIBRARY REQUESTS WAITING FOR PROCESSING----
    ENTERS    EJECTS   AUDITS
    aaaaaa    bbbbbb   cccccc
```

The fields in the data line are defined as follows:

aaaaaa
> Total number of tape volume entry requests waiting for processing. This is the total number of volumes recognized by OAM as being in the library manager insert category waiting to be processed. If OAM has not received the attention interrupt signalling the addition of cartridges to the insert category, the entered volumes will not be included in the summary count even though they have physically been entered into a library.

bbbbbb
> Total number of user initiated tape volume eject requests waiting for processing in the OAM address space that have not yet been sent to the library manager.

cccccc Total number of tape volume audit requests waiting for processing in the OAM address space that have not yet been sent to the library manager.

Note: All counts are a snapshot-in-time, so the counts can quickly change.

To display detail information on active tape library requests, enter one of the following commands:

```
F OAM,QUERY,ACTIVE,DETAIL,ALL

          or

F OAM,QUERY,ACTIVE,DETAIL,AUDIT

          or

F OAM,QUERY,ACTIVE,DETAIL,EJECT

          or

F OAM,QUERY,ACTIVE,DETAIL,ENTER
```

The following message is displayed when either the ALL or AUDIT keyword is used in the command:

```
CBR1773I Auditing tape volume volser, in library lib_name,
         for user userid, request= request.
```

The following message is displayed when either the ALL or EJECT keyword is used in the command:

```
CBR1774I Ejecting tape volume volser, from library lib_name, for user userid.
```

The following message is displayed when either the ALL or ENTER keyword is used in the command:

```
CBR1775I Tape cartridge entry request in process on library lib_name.
```

To display detail information on waiting tape library requests, enter one of the following commands:

```
F OAM,QUERY,WAITING,DETAIL,ALL

          or

F OAM,QUERY,WAITING,DETAIL,AUDIT

          or

F OAM,QUERY,WAITING,DETAIL,EJECT

          or

F OAM,QUERY,WAITING,DETAIL,ENTER
```

The following message is displayed when either the ALL or AUDIT keyword is used in the command:

```
CBR1783I Audit request for tape volume volser in library lib_name, for user
         userid, waiting to be processed, request = request.
```

The following message is displayed when either the ALL or EJECT keyword is used
in the command:

```
CBR1784I Eject request for tape volume volser in library lib_name, for user
         userid, waiting to be processed.
```

The following message is displayed when either the ALL or ENTRY keyword is used
in the command:

```
CBR1785I    number tape cartridge entry requests for library lib_name
            waiting to be processed.
```

Chapter 6. LCS External Services

This chapter contains General-use Programming Interface and Associated Guidance Information.

Library Control System (LCS) External Services

Library Control System (LCS) External Services provides a programming interface that allows you to access and manipulate information about each tape volume record in the TCDB. Executable macro CBRXLCS is used to invoke the LCS External Services to perform the following functions:
- Change the use attribute of a volume
- Enter one or more volumes into a manual tape library dataserver
- Eject a tape cartridge from a tape library
- Query the name and type of a tape library where a specified volume resides
- Determine whether a tape volume can be mounted on a specific device
- Export a list of logical volumes from a VTS
- Import a list of logical volumes into a VTS

Note: You may have an environment with multiple systems at different levels sharing a common TCDB. In this event, if a system attempts to perform a CBRXLCS function against a volume that has a media type or recording technology that is not recognized, the request fails.

Change Use Attribute (CUA)

The change use attribute (CUA) function changes the status of the specified volume from private to scratch, scratch to private, private to private, or scratch to scratch, and updates the tape volume record in the TCDB. It also calls the change use attribute installation exit to allow the installation to approve or disapprove the change in the volume status and to set values for many of the fields in the volume record. See "Change Use Attribute Installation Exit (CBRUXCUA)" on page 149.

Manual Cartridge Entry (MCE)

The manual cartridge entry (MCE) function allows the user to enter a list of one or more tape cartridges into a manual tape library dataserver. When the MCE function is invoked, the volume is added to the tape volume inventory maintained by the library manager and a tape volume record is created or updated in the TCDB. MCE calls the cartridge entry installation exit to allow the installation to approve or disapprove the entry of the cartridge into the manual tape library dataserver, and to set values for many of the fields in the volume record. For more information regarding the cartridge entry installation exit, see "Cartridge Entry Installation Exit (CBRUXENT)" on page 156.

Cartridge Eject (EJECT)

The cartridge eject (EJECT) function allows the user to eject a tape cartridge from a tape library. The tape volume record in the TCDB may be kept or purged. EJECT calls the cartridge eject installation exit, which allows the installation to approve or disapprove the ejection of the cartridge from the tape library. See "Cartridge Eject Installation Exit (CBRUXEJC)" on page 164 for more information regarding the cartridge eject installation exit.

Query Volume Residence (QVR)

The query volume residence (QVR) function allows the installation to query the residency and type of library in which a specified volume resides. It also returns the console name associated with the library, if one has been specified by the installation, and if requested, other available information about the volume from the TCDB and library manager inventory.

Additionally, QVR provides audit capabilities from a tape management system database, since QVR does not require the presence of a TCDB record to perform this audit. A tape management system can use this capability to verify its inventory against the TCDB and the library manager inventory. It can also be used to track and verify the library residency of volumes that are not managed in the TCDB, such as stacked volumes in a VTS.

Test Volume Eligibility (TVE)

The test volume eligibility (TVE) function verifies that the specified tape volume serial number can be mounted on the specified tape device.

Export Logical Volumes (EXPORT)

After the tape management system or customer utility has written the list of logical volumes to export on an export list volume (logical volume residing in the same library as the volumes to be exported), the export function can be used to identify the logical volumes to export and to initiate the export operation at the library. This interface can also be used to cancel an executing export operation.

Import Logical Volumes (IMPORT)

After the tape management system or customer utility has written the list of logical volumes to import on an import list volume (logical volume residing in the same library as the volumes to be imported), the import function can be used to identify the logical volumes to import and to initiate the import operation at the library. This interface can also be used to cancel an existing import operation.

CBRXLCS Macro Interface

An executable macro CBRXLCS is used to invoke the functions provided by LCS External Services. The macro expansion sets parameter values in the LCS External Services parameter list (LCSPL), which is mapped by the CBRLCSPL macro, retrieves the entry point for LCS External Services, and branches to perform the requested function.

The following diagrams illustrate the syntax for required and optional parameters for each CBRXLCS function. More information about using the macro is provided in "CBRXLCS Assembler Macro Usage" on page 131.

Changing the Use Attribute of a Volume

Figure 7 on page 109 provides the CBRXLCS Assembler H macro syntax that is used to perform the change use attribute function.

```
CBRXLCS  TYPE=TAPE
         ,FUNC=CUA
         ,USE={PRIVATE|SCRATCH}]
         ,VOLUME=volume-serial-number
         [,DEVTYPE=tape-device-selection-information-address
         [,EXPDATE=volume-expiration-date]
         [,GRPNAME=storage-group-name]
         [,WRTDATE=YES]
         [,WRTPROT=write-protection-status]
         [,EXITINFO=installation-exit-information]
```

Figure 7. CBRXLCS CUA Assembler H Macro Syntax

When a value or address is requested, the keyword operand may be:
* The name of the field that contains the requested value or address
* The number, in parentheses, of a general register in the range of 2 through 12 that contains the address of the field

Note: The change use attribute function can also be used to remove a volume from the error category in the hardware.

Parameter Description

TYPE=TAPE
Specifies a request related to the TCDB.

FUNC=CUA
Specifies a request to change the use attribute of a single volume to that of the change use attribute specified in the USE field.

USE=PRIVATE
Specifies that the volume use attribute be set to private for the volume.

USE=SCRATCH
Specifies that the volume use attribute be set to scratch for the volume.

VOLUME=volume-serial-number
Specifies the name of a character variable (six-byte length), which contains the volume serial number of the volume whose use attribute is to be changed. The volume serial number must be left justified in the field and padded on the right with blanks. If the volume resides in a library, the library must be defined in the active SMS configuration.

DEVTYPE=_tape-device-selection-information-address_
>   Specifies the name of a variable which contains the address of the tape device
>   selection information to be associated with the data sets written on this tape
>   volume. The TDSI is mapped by the structure CBRTDSI (see Figure 16 on
>   page 147), and consists of four one-byte fields which specify recording
>   technology, media type, compaction indicator, and special attribute to be
>   associated with the volume.
>
>   The following three fields in the TDSI may be specified on a CUA request:
>   * Recording technology may be specified as unknown, 18TRACK, 36TRACK,
>   128TRACK, or 256TRACK.
>   * Media type may be specified as unknown, MEDIA1, MEDIA2, MEDIA3, or
>   MEDIA4.
>   * Compaction may be specified as unknown, none, or compacted.
>
>   Any nonzero TDSI field specified for input is merged with the tape device
>   selection information recorded on the volume record. If incompatible tape device
>   selection attributes, such as 18TRACK recording technology and MEDIA2, or
>   18TRACK or 36TRACK recording technology and MEDIA3 or MEDIA4 result
>   from merging the input, an error is returned and CUA processing is not
>   performed. If CUA processing is successful, the TDSI in the volume record in
>   the TCDB is updated with the new, merged values.
>
>   DEVTYPE is used only when USE=PRIVATE is specified, and is otherwise
>   ignored.

EXPDATE=_volume-expiration-date_
>   Specifies the name of a variable (four-byte length), which contains the
>   expiration date assigned to the volume. The expiration date should be specified
>   in TIME DEC format; for example, packed decimal digits of the form
>   0CYYDDDF. This field is only used when USE=PRIVATE is specified, and is
>   otherwise ignored. If the change use attribute installation exit is invoked, the
>   value specified by the exit may override the volume expiration date.

GRPNAME=_storage-group-name_
>   Specifies the name of a character variable (eight-byte length) which contains
>   the name of the storage group to which the volume belongs. The storage group
>   name must be left justified in the field, and padded on the right with blanks, if
>   necessary. This field is only used when USE=PRIVATE is specified, and is
>   otherwise ignored. If a nonblank storage group name is specified on a change
>   to PRIVATE, the storage group must be a tape storage group defined in the
>   active configuration. Additionally, if the volume is library-resident, the library
>   must also be defined to the storage group. If a storage group name is specified
>   and there is a change from PRIVATE to PRIVATE, the existing storage group
>   name in the volume record is updated. On a change from PRIVATE to
>   PRIVATE, if no storage group name is specified, the existing storage group
>   name in the TCDB is retained. On a change from SCRATCH to PRIVATE, if no
>   storage group name is specified, the field is set to blanks. If the change use
>   attribute installation exit is invoked, the value specified by the exit may override
>   the storage group name.

WRTDATE=YES
>   Specification of this keyword requests the update of the date when a data set
>   was last opened for OUTPUT. The tape volume record is updated with the
>   current date, as returned by the MVS TIME macro, translated into ISO format
>   (YYYY-MM-DD). When this keyword is specified the last mounted date is also
>   set to the current date. This field is only used when USE=PRIVATE is specified,

and is otherwise ignored. If the change use attribute installation exit is invoked, it may override the last written date and last mounted date.

WRTPROT=*write-protection-status*
Specifies the name of a character variable (one-byte length), which contains the volume write protection status. If the write-protect tab is set on the tape cartridge, this field should be set to **Y**; if the tab is not set, this field should be set to **N**; if the tab setting is unknown, it should be set to blank. This field is only used when USE=PRIVATE is specified, and is otherwise ignored. If the change use attribute installation exit is invoked, the value specified by the exit may override the write protection status.

EXITINFO=*installation-exit-information*
Specifies the name of a character variable (16-byte length) that contains a customer specified free-form value to be passed to the change use attribute installation exit (CBRUXCUA).

Successful Change Use Attribute Processing

When the change use attribute function is successful, the following processing occurs:

- The use attribute of the volume specified with the VOLUME keyword is changed to the requested value.
- The tape volume record is updated with the values specified on the CBRXLCS macro invocation, by the change use attribute installation exit, or both.
- If the volume resides in a library, the category of the volume is changed in the hardware inventory to the requested value.

Unless the change use attribute installation exit (CBRUXCUA) has been disabled or the installation has indicated that it should not be called, the change use attribute installation exit is invoked for every request to change the use attribute of a volume. See "Change Use Attribute Installation Exit (CBRUXCUA)" on page 149 for further discussion of the exit.

Changing the Use Attribute from Scratch to Private
For a request to change a volume to PRIVATE, the optional parameters which are specified on the CBRXLCS invocation are passed to the installation exit for approval. The exit may override the values supplied on the macro invocation, and the values supplied by the exit are committed to the tape volume record if CUA processing is successful.

Changing the Use Attribute from Private to Scratch
For a request to change a volume to SCRATCH, optional parameters are ignored on the CBRXLCS macro invocation. Upon return from the installation exit, the following default values are set in the tape volume record:
- Volume use attribute = **S**
- Storage group name = ***SCRTCH***
- Write protection status = **N**
- Checkpoint volume indicator = **N**
- Volume expiration date = blank
- Tape device selection values
  - Recording technology is unchanged
  - Media type is unchanged
  - Compaction indicator is unchanged
  - Special attribute is set to none

When the volume whose use attribute is to be changed resides in a tape library, a call is made to the hardware to change the category of the volume. If the hardware change is not successful, the tape volume record is not updated and CUA processing fails. If the category of the volume is successfully changed, the scratch count for the library is updated with the number of scratch cartridges returned from the hardware.

If changing the use attribute of the volume causes the number of scratch volumes of a particular type in a library to fall below the scratch volume threshold established through the ISMF library management application, operation action message CBR3660A is issued requesting that the operator add the appropriate type of scratch cartridges to the library. If CUA processing causes the scratch count to exceed twice the scratch volume threshold for the scratch type being processed, operation action message CBR3660A is deleted if it is outstanding.

Changing to the Same Use Attribute

When the requested use attribute is the same as the existing use attribute – for example, the change is from PRIVATE to PRIVATE or from SCRATCH to SCRATCH – the tape volume record is updated with values specified on the CBRXLCS macro invocation, the installation exit, or both; however, a warning return code is returned. In both cases, if the volume resides in a tape library, a call is made to the library to change the category of the volume in the library manager inventory.

Return and Reason codes for CBRXLCS Change Use Attribute

The return code is placed in register 15 and in the LCSPL in field LCSRCODE. The reason code is placed in register 0 and in the LCSPL in field LCSREAS.

Table 2 provides the reason codes associated with each of the return codes returned by change use attribute processing. See "CBRXLCS Return Codes" on page 132 for more information. Also, for more information concerning other return and reason codes not specific to change use attribute processing, refer to *OS/390 DFSMSdfp Diagnosis Reference*.

Table 2. Change Use Attribute Return and Reason Codes

Return Code	Error Type	Reason Code	Meaning
0	Successful	0	Successful execution.
4	Warning	4	Requested change to scratch but volume was already scratch.
		5	Requested change to private but volume was already private.
		8	Scratch volume threshold processing did not successfully complete. Check the console log for further diagnostic information.
		131	Scratch volume threshold processing not performed because library was not operational.
8	Invalid request	9	Required type parameter not specified.
		11	Invalid value specified for type.
		12	Required function parameter not specified.
		13	Invalid value specified for function.
		14	Required use parameter not specified.
		15	Invalid value specified for use.
		16	Required volume parameter not specified.
		17	Invalid volume serial specified.

Table 2. Change Use Attribute Return and Reason Codes (continued)

Return Code	Error Type	Reason Code	Meaning
		25	Invalid expiration date specified.
		26	Library in which volume resides not defined to specified storage group.
		28	Invalid write protect value specified.
		29	Invalid parameter address for LCSPL.
		30	LCSPL not aligned on fullword boundary.
		34	Invalid storage group name specified.
		38	Invalid compaction type specified in TDSI.
		39	Invalid special attribute specified in TDSI.
		40	Invalid combination of TDSI values specified.
		41	Ambiguous TDSI combination specified.
		42	Special attribute specified but not allowed on a CUA request.
		43	Invalid pointer to TDSI specified.
		54	Storage group not of type tape.
12	Failure	6	Request failed because CUA processing disabled for private to scratch requests.
		7	Installation exit vetoed the requested change.
		53	Library not defined to active configuration.
		58	Failure accessing volume record in TCDB.
		59	Failure accessing library record in TCDB.
		60	Failure accessing SMS storage group constructs.
		61	Device services failure.
		63	Volume record not found in TCDB.
		64	Library record for specified volume not found in TCDB.
		65	No library attached at last IPL.
		70	Volume not found in library manager inventory.
		82	Installation exit abended.
		83	Installation exit returned bad data.
		84	Abend occurred during LCS External Services processing.
		310	Media type or recording technology not supported at this software level.
16	Environment	2	OAM control blocks not available.
		80	LCS External Services unable to establish an ESTAE.
		81	LCS External Services unable to obtain storage for installation exit parameter list.

Entering Cartridges into a Manual Tape Library

Figure 8 on page 114 provides the CBRXLCS Assembler H macro syntax that is used to perform the manual cartridge entry function.

```
CBRXLCS  TYPE=TAPE
         ,FUNC=MCE
         ,LIBNAME=library-name
         ,VOLLIST=volume-list-pointer
         [,EXITINFO=installation-exit-information]
```

Figure 8. CBRXLCS MCE Assembler H Macro Syntax

When a value or address is requested, the keyword operand may be:
- The name of the field that contains the requested value or address
- The number, in parentheses, of a general register in the range of 2 through 12 that contains the address of the field

Parameter Description

TYPE=TAPE
Specifies a request related to the TCDB.

FUNC=MCE
Specifies a request to enter a list of one or more volumes into a manual tape library dataserver.

LIBNAME=library-name
Specifies the name of a character variable (eight-byte length) that contains the fully-specified library name. The library name must be left justified in the field and padded on the right with blanks.

VOLLIST=volume-list-pointer
Specifies a variable that contains the address of the list of volumes to be entered into the manual tape library dataserver.

The volume list mapping, LCSV and LCSMLIST, is declared in mapping macro CBRLCSPL. LCSV is the header for the volume list, and LCSMLIST maps the array of volumes and the associated information for each. Volume-list-pointer contains the address of the list header.

Each member of the volume list array contains the volume serial number, left-justified in a six-character field and padded on the right with blanks; a six-byte reserved area; a four-byte field for tape device selection information (TDSI); and two full words into which LCS External Services stores the return code and reason code for this volume.

Processing the Tape Device Selection Information (TDSI)
The tape device selection information for each volume is processed as follows:

- If a volume record exists for the volume to be entered into the manual tape library dataserver, all TDSI values are ignored and the values from the existing volume record are passed to the cartridge entry installation exit (CBRUXENT).

- If no volume record exists for the volume to be entered into the manual tape library dataserver, TDSI values are processed as follows:

  - Recording technology specified in TDSI is ignored. If the volume is MEDIA2, recording technology is set to 36-track and passed to the cartridge entry installation exit. If media type is MEDIA1 or unknown, recording technology is set to the value specified in default entry data class and passed to the exit. The installation exit may either set recording technology if it was not specified in the default entry data class or it may override that value.

If the volume is MEDIA1 and private, and has no recording technology specification from default entry data class, recording technology is set to 36-track.

– Media type for the volume must be set before the volume can be entered into the manual tape library dataserver. Media type may be specified by any of the following:

- Input TDSI—specified in field LCSMMED.

- Default entry data class—this value is used only if no TDSI media type was specified.

- Cartridge entry installation exit (CBRUXENT)—may provide the media type if it is not specified in TDSI or default entry data class, or may override the value specified. If the installation exit is invoked and returns an invalid media type, cartridge entry processing is discontinued.

   If media type is not available from any of the sources listed above, the volume is not entered into the MTLDS.

– Compaction type specified in TDSI is ignored, and the UNKNOWN value is passed to the installation exit. The exit may specify a value for compaction type.

– Special attribute specified in TDSI is ignored and a value of NONE is passed to the installation exit. The exit may specify a value for special attribute.

Note: MCE only supports MEDIA1 and MEDIA2.

EXITINFO=_installation-exit-information_
Specifies the name of a character variable (16-byte length) that contains a customer-specified free-form value that is passed to the cartridge entry installation exit (CBRUXENT).

Successful MCE Processing

Cartridge entry using the CBRXLCS MCE programming interface is designed to be consistent with cartridge entry into a manual tape library dataserver at the library manager console, and with cartridge entry into an ATLDS.

Note: If a volume is in an error state in the library manager inventory, in order to clear the error, the cartridge must be re-entered into the library at the library manager console rather than through the CBRXLCS MCE programming interface.

The permanent OAM control block structure must be available in order for manual cartridge entry to be performed. This means that the OAM address space must have been started since the last IPL.

While manual cartridge entry processing is in progress, any attempt to start or restart the OAM address space is delayed until MCE processing is complete.

The manual tape library dataserver into which the volumes are to be entered must be online and operational.

When manual cartridge entry is successful, the following processing occurs:
• Each volume in the input list is entered into the volume inventory maintained by the library manager.
• If the volume is successfully entered into the library manager's inventory, the corresponding tape volume record is either created or updated in the TCDB.
• TDSI for the volume is returned in LCSMTDSI in structure LCSMLIST.

- After all volumes in the list have been entered, the scratch volume counts in the library record in the TCDB are updated with the scratch volume counts obtained from the library manager.
- Message CBR3610I is issued to inform the operator of the volumes which have been entered into the library.

If the cartridge entry installation exit (CBRUXENT) is disabled, cartridge entry processing is not performed. Unless the installation has indicated that the cartridge entry installation exit should not be called, it is invoked for every volume in the list.

The volume serial number for each of the volumes entered into a manual tape library dataserver must meet the same character set defined for an ATLDS: upper case alphabetics or numerics. The volume serial may not contain any imbedded blanks.

The volume serial for each volume entered into a manual tape library dataserver may not be a duplicate of a known DASD volume, or a tape volume which resides in another tape library dataserver (according to the tape volume record in the TCDB), or of a volume which resides in the library manager inventory for the specified library.

If a volume record exists for a private volume and it contains a nonblank storage group name, the storage group name is validated. If the storage group is not "tape", is not defined to the active SMS configuration, or does not contain the library specified for the MCE request, the request fails and the volume is not entered into the library.

If a volume record exists in the TCDB for an MCE volume and the volume record indicates that the volume already resides in the specified library, MCE processing proceeds. If the volume is not listed in the library manager inventory, it is added and a warning return code is issued. If the volume is already in the library manager inventory, the request fails.

If an error is encountered while processing one of the volumes, the return and reason codes for that volume are stored in the fields LCSMRET and LCSMREAS in the volume list array, and processing continues for the rest of the volumes. If an error occurs which causes cartridge entry to be disabled or suspended, no more volumes are processed and error return and reason codes are set for the remaining volumes in the list.

If a volume record exists for the volume entered into the manual tape library dataserver, tape device selection information is processed as shown in Table 3.

Table 3. TDSI Processing for MCE—Volume Exists

TDSI Attribute	TDSI Input	Default Entry Data Class	Installation Exit	Volume Record
Recording technology	Ignored	Ignored	May override existing volume record	Updated only if installation exit makes change
Media type	Ignored	Ignored	May override existing volume record	Updated only if installation exit makes change
Compaction	Ignored	Not applicable	May override existing volume record	Updated only if installation exit makes change
Special attribute	Ignored	Not applicable	May override existing volume record	Updated only if installation exit makes change

If no volume record exists for the volume entering the manual tape library dataserver, the tape device selection information is processed as shown in Table 4.

Table 4. TDSI Processing for MCE—No Volume Record Exists for Volume

TDSI Attribute	TDSI Input	Default Entry Data Class	Installation Exit	Volume Record
Recording technology	Ignored	May specify value	May specify value if not provided by default entry data class, or may override default entry data class.	Created as 36-track for MEDIA2, otherwise created with value specified by default entry data class or installation exit. However, if volume is private and MEDIA1, no value is specified by default entry data class or the exit; set to 36-track.
Media type	May be specified	Used if no TDSI value specified	May specify value if not provided in TDSI or default entry data class, or may override value from either source.	Created with value specified in TDSI or default entry data class or installation exit.
Compaction	Ignored	Not applicable	May specify value.	Created with value specified by installation exit. If no value specified, set to UNKNOWN.
Special attribute	Ignored	Not applicable	May specify value.	Created with value specified by installation exit. If no value specified, set to NONE.

Return and Reason Codes for CBRXLCS Manual Cartridge Entry

The return code reflecting the most severe error is placed in register 15 and in the LCSPL in field LCSRCODE. The return code for each volume is returned in the field LCSMRET in the volume list array.

The reason code associated with the most severe return code is placed in register 0 and in the LCSPL in field LCSREAS. The reason code for each volume is returned in the field LCSMREAS in the volume list array.

Table 5 provides the reason codes associated with each of the return codes returned by manual cartridge entry processing. For more information, see "CBRXLCS Return Codes" on page 132. Also, for more information concerning other return and reason codes not specific to manual cartridge entry processing, see *OS/390 DFSMSdfp Diagnosis Reference*.

Table 5. Manual Cartridge Entry Return and Reason Codes

Return Code	Error Type	Reason Code	Meaning
0	Successful	0	Successful execution.
4	Warning	8	Scratch volume threshold processing did not successfully complete. Check the console log for further diagnostic information.
		97	Volume not entered because the volume serial is the same name as a known DASD volume.
		130	MCE processing performed for volume that already had volume record indicating that it resided in the specified library. New entry created for volume in library manager inventory.

Table 5. Manual Cartridge Entry Return and Reason Codes (continued)

Return Code	Error Type	Reason Code	Meaning
		131	Scratch volume threshold processing not performed because library was not operational.
8	Invalid request	9	Required type parameter not specified.
		11	Invalid value specified for type.
		12	Required function parameter not specified.
		13	Invalid value specified for function.
		17	Invalid volume serial number specified.
		20	Required volume list not specified.
		21	Invalid header value specified in volume list.
		23	Required library name parameter not specified.
		26	MCE library is not defined to storage group on tape volume record.
		27	Invalid library name specified.
		29	Invalid parameter address specified for LCSPL or VOLLIST.
		30	LCSPL or VOLLIST not aligned on fullword boundary.
		34	Storage group listed on volume record in TCDB is not of type tape, not part of the active SMS configuration, or does not contain the library specified for the MCE request.
		35	Required media type not specified from any source.
		53	Library not defined to active configuration.
		54	Storage group specified on volume record is type tape.
		92	Library specified is not MTLDS.
		94	Volume of same name resides in another tape library.
		97	Volume of same name is known DASD volume.
12	Failure	60	Failure accessing SMS storage group constructs.
		72	Request failed because all library cells are full.
		74	Request failed because the specified volume serial number already exists in library manager inventory.
		75	UCB scan failure when attempting to determine volume serial uniqueness.
		76	Libserv failure when attempting to enter the volume into the MTLDS.
		77	Libserv failure when attempting to eject the volume into the MTLDS.
		78	Catalog failure when attempting to retrieve volume record.
		79	Catalog failure when attempting to update the volume record.
		84	Abend occurred during LCS external services processing.
		95	Installation exit vetoed the entry of the volume into the library.
		96	Installation exit said to ignore the volume.
		310	Media type or recording technology not supported at this software level.
		311	Media type and recording technology not supported in MTL.
16	Environment	2	OAM control block structure not available.
		80	LCS External Services unable to establish an ESTAE.
		90	Cartridge entry disabled due to an error in the installation exit.

Table 5. Manual Cartridge Entry Return and Reason Codes (continued)

Return Code	Error Type	Reason Code	Meaning
		91	Cartridge entry temporarily suspended.
		93	Library is offline, pending offline, or not operational.

Ejecting a Cartridge

Figure 9 provides the CBRXLCS Assembler H macro syntax that is used to perform the cartridge eject function.

```
CBRXLCS  TYPE=TAPE
         ,FUNC=EJECT
         ,VOLUME=volume-serial-number
         [,EJECTOPT={KEEP|PURGE}]
         [,BULKEJCT={YES|NO}]
         [,EXITINFO=installation-exit-information]
         [,USERID=userid]
```

Figure 9. CBRXLCS EJECT Assembler H Macro Syntax

When a value is requested, the keyword operand may be:
* The name of the field that contains the requested value
* The number, in parentheses, of a general register in the range of 2 through 12 that contains the address of the field

Parameter Description

TYPE=TAPE
Specifies a request related to the TCDB.

FUNC=EJECT
Specifies a request to eject one volume from a tape library.

VOLUME=*volume-serial-number*
Specifies the name of a character variable (six-byte length) that contains the volume serial number of the volume to be ejected. The volume serial number must be left justified in the field and padded on the right with blanks.

EJECTOPT=KEEP
Specifies that the TCDB record for the tape volume being ejected should *not* be deleted after the eject completes successfully.

EJECTOPT=PURGE
Specifies that the TCDB record for the tape volume being ejected should be deleted after the eject completes successfully.

If the EJECTOPT parameter is specified on the macro invocation, the cartridge eject installation exit may override it.

If the EJECTOPT parameter value is not specified on the macro invocation, the eject default is used. (This default is established when the library is defined by the storage administrator using the ISMF library define panel.) However, the cartridge eject installation exit (CBRUXEJC) may ultimately override the value.

BULKEJCT=YES
Specifies that the ejected cartridge be placed in the high-capacity output station

of an ATLDS. If this parameter is not specified or the high-capacity output station is not configured, the cartridge is placed in the convenience output station. If a convenience station is not installed in a 3494, the cartridge is placed in the single cell output area.

BULKEJCT=NO
Specifies that the cartridge be placed in the convenience output station of an ATLDS. This is the default.

Note: For a manual tape library dataserver, BULKEJCT is ignored.

EXITINFO=_installation-exit-information_
Specifies the name of a character variable (16-byte length) that contains a customer specified free-form value that is passed to the cartridge eject installation exit (CBRUXEJC).

USERID=_userid_
Specifies the name of a character variable (8-byte length) that contains a TSO user ID. The field must be left-justified and padded on the right with blanks.

After the eject request is successfully scheduled (a zero return and reason code from the CBRXLCS macro invocation), eject completion or failure messages are sent to this user ID through the system services SEND interface.

Successful EJECT Processing

When the EJECT completes successfully, the following processing occurs:
- The requested volume is ejected from the library.

  For an ATLDS, the volume is placed in an output station of the library. For an MTLDS, it is the operator's responsibility to physically remove the cartridge from the manual tape library dataserver. The volume record is deleted from the library manager inventory. An eject completion message is sent to the optional TSO user ID specified on the macro invocation and to an MVS console.
- The TCDB record for the volume is either kept or purged as stipulated by one of the following:
  - The installation exit
  - The parameter specified on the macro invocation
  - The default disposition defined for all volumes in the library
- If the TCDB record is kept, it is updated to note that the volume is no longer in the library.
- When the EJECT of a volume is not successfully scheduled through the CBRXLCS macro invocation, the error messages are sent to the system log to provide an audit trail.

Return and Reason Codes for CBRXLCS Eject

The return code is placed in register 15 and in the LCSPL in field LCSRCODE. The reason code is placed in register 0 and in the LCSPL in field LCSREAS.

Note: A zero return and reason code from the CBRXLCS EJECT function do not indicate that the cartridge has been ejected; however, they do indicate that the CBRXLCS EJECT function was successful in scheduling the request into the OAM address space for later processing. When the eject request is later processed, the OAM address space relays the success or failure of the eject through the issuance of messages.

Table 6 provides the reason codes associated with each of the return codes returned by cartridge eject processing. For more information, see "CBRXLCS Return Codes" on page 132. Also, for more information concerning other return and reason codes not specific to cartridge eject processing, refer to *OS/390 DFSMSdfp Diagnosis Reference*.

Table 6. Cartridge Eject Return and Reason Codes

Return Code	Error Type	Reason Code	Meaning
0	Successful	0	Successfully scheduled.
4	Warning		No warnings are returned by EJECT.
8	Invalid request	9	Required type parameter not specified.
		11	Invalid value specified for type.
		12	Required function parameter not specified.
		13	Invalid value specified for function.
		16	Required volume parameter not specified.
		17	Invalid volume serial specified.
		29	Invalid parameter address specified for LCSPL.
		30	LCSPL not aligned on fullword boundary.
		201	Volume already ejected (not in library).
		202	Invalid value specified for eject option.
		203	Invalid value specified for bulk eject.
		204	The userid specified contains all binary zeroes or blanks.
12	Failure	45	Library name as defined in volume record is unknown in SMS configuration.
		84	Abend occurred during LCS External Services processing.
		300	OAM abend during eject request processing.
		302	Eject request already pending for volume.
		303	Unable to make user address space nonswappable.
		304	TCDB access error in OAM.
		305	TCDB authorization error in OAM.
		306	OAM internal error.
		307	Volser not in TCDB.
		310	Media type or recording technology not supported at this software level.
16	Environment	2	OAM control block structure not available.

Table 6. Cartridge Eject Return and Reason Codes (continued)

Return Code	Error Type	Reason Code	Meaning
		80	LCS External Services unable to establish an ESTAE.
		400	OAM initialized with null configuration (no libraries).
		401	Library not accessible: offline, pending offline, or not operational.
		402	Vision system inoperative.
		403	Eject processing has been disabled because an error in the eject installation exit has been detected.
		404	OAM address space not available.

Querying the Residence of a Volume

Figure 10 provides the CBRXLCS Assembler H macro syntax that is used to perform the query volume residence function:

```
CBRXLCS   TYPE=TAPE
          ,FUNC=QVR
          ,VOLUME=volume-serial-number
          [,LIBNAME={library-name}]
          [,VOLINFO={YES|NO}]
          [,SUBPOOL={spno}]
```

Figure 10. CBRXLCS QVR Assembler H Macro Syntax

When a value is requested, the keyword operand may be:
- The name of the field that contains the requested value
- The number, in parentheses, of a general register in the range of 2 through 12 that contains the address of the field

Parameter Description

TYPE=TAPE
   Specifies a request related to the TCDB.

FUNC=QVR
   Specifies a request to return the name and type of library in which the given volume is resident.

VOLUME=volume-serial-number
   Specifies the name of a character variable (six-byte length) that contains the volume serial number of the volume whose residence is to be determined. The volume serial number must be left justified in the field and padded on the right with blanks.

LIBNAME=library-name
   Specifies the name of a character variable (eight-byte length), that contains the name of the library where the volume is expected to reside. The library name must be left justified in the field and padded on the right with blanks.

   If the volume has no volume record in the TCDB, QVR checks for the volume in the specified library. If the volume has a record in the TCDB, QVR validates that the specified library and the library indicated on the volume record match. It also checks to see the whether the volume physically resides in the library specified by this parameter.

Note: A library name of SHELF is considered invalid. The SHELF library name is reserved for shelf-resident volumes.

VOLINFO=YES | NO
Specification of this keyword requests that QVR return the information available about the volume from both the volume record in the TCDB and the library manager inventory.

SUBPOOL=_spno_
Specifies the name of a bit variable (1-byte length) that contains the number of the subpool from which storage for the volume information is obtained. If no subpool is specified, storage is obtained from subpool 0 in the key of the caller. This keyword is only used when VOLINFO=YES is specified, and is otherwise ignored.

Successful Query Volume Residence Processing

When the query volume residence function is successful and the volume resides in a library, the following fields in the LCSPL (Figure 14 on page 133) are updated:
- The name of library in which the volume resides is returned in field LCSLIBNM. This may be the library name found in the volume record or the library name specified in the QVR invocation. TVILIBNM contains the library name stored in the TCDB for comparison.
- If the library is an ATLDS, the flag LCSATL is turned on.
- If the library is a MTLDS, the flag LCSMTL is turned on.
- If a console name has been specified for the library, it is returned in LCSCONSN. Otherwise, LCSCONSN is set to blanks.
- If VOLINFO=YES was specified, LCSTVI@ contains the address of the requested volume information. The information is mapped by macro CBRTVI (see Figure 15 on page 143 for detail).

Note: The caller must free the storage obtained for the tape volume information.

Return and Reason Codes for CBRXLCS Query Volume Residence

The return code is placed in register 15 and in the LCSPL in field LCSRCODE. The reason code is placed in register 0 and in the LCSPL in field LCSREAS.

Table 7 on page 124 provides the reason codes associated with each of the return codes returned by query volume residence function. For more information, see "CBRXLCS Return Codes" on page 132. Also, for more information concerning other return and reason codes not specific to the query volume residence function, refer to _OS/390 DFSMSdfp Diagnosis Reference._

Table 7. Query Volume Residence Return and Reason Codes

Return Code	Error Type	Reason Code	Meaning
0	Successful	0	Successful execution. If VOLINFO=YES was specified, TVI contains TCDB and library manager information. If LIBNAME was specified, the specified library name and the volume record library name match and the library manager information indicates the volume resides in the specified library. If neither VOLINFO nor LIBNAME is specified, the volume record was found in the TCDB and the TCDB record indicates the volume is library-resident; no library manager validation was performed.
4	Warning	52	Volume is shelf-resident. If VOLINFO=YES was specified, TVI contains only TCDB information. LIBNAME was not specified.
		61	Unable to access library manager. If VOLINFO=YES, TVI contains only TCDB information. If LIBNAME was specified, the library name specified and the volume record library name matched.
		63	Volume record for specified volume not found in TCDB. If VOLINFO=YES was specified, no volume information is returned.
		70	Volume not found in library manager inventory. If VOLINFO=YES was specified, TVI contains only TCDB information. If LIBNAME was specified, the library name specified and the volume record library name matched.
		134	No volume record was found in the TCDB; however, LIBNAME was specified and the volume resides in the specified library. If VOLINFO=YES was specified, TVI contains only library manager information.
		135	Volume record was found in the TCDB. LIBNAME was specified and the volume was found in the library specified. However, the volume record library name and the specified library name did not match. If VOLINFO=YES was specified, TVI contains the volume TCDB information and the library manager information from the library specified for LIBNAME.
		136	Volume record was found in the TCDB. LIBNAME was specified and the volume was not found in the library specified. The volume record library name and the specified library name did not match. If VOLINFO=YES was specified, TVI contains only the volume TCDB information.
		137	Volume record was found in the TCDB. LIBNAME was specified. The volume record library name and the specified library name did not match. Unable to access the library manager of the specified library. If VOLINFO=YES was specified, TVI contains only the volume TCDB information.
8	Invalid request	9	Required type parameter not specified.
		11	Invalid value specified for type.
		12	Required function parameter not specified.

Table 7. Query Volume Residence Return and Reason Codes (continued)

Return Code	Error Type	Reason Code	Meaning
		13	Invalid value specified for function.
		16	Required volume parameter not specified.
		17	Invalid volume serial specified.
		27	Invalid library name specified. SHELF is a reserved name and not allowed for library name specification.
		29	Invalid address specified for LCSPL.
		30	LCSPL not aligned on fullword boundary.
12	Failure	45	Library name as defined in volume record is unknown in the SMS configuration.
		58	Failure accessing volume record in TCDB.
		59	Failure accessing library record in TCDB. If LIBNAME was specified, there was a failure accessing the library record in TCDB for the specified library name. If LIBNAME was not specified, the failure was in accessing the library record in TCDB for the library name found in the volume record.
		64	Library record not found for specified library.
		65	Library logical type not defined. If LIBNAME is not specified, library logical type is not defined for the library name found in the volume record. If LIBNAME is specified, library logical type is not defined for the library name specified.
		84	Abend occurred during LCS External Services processing.
		310	Media type or recording technology not supported at this software level.
		319	No volume record found in the TCDB. LIBNAME was specified. The volume was not in the library specified. If VOLINFO=YES was specified, no TVI information is returned.
		320	No volume record found in the TCDB. LIBNAME was specified. Unable to access library manager for the library specified. If VOLINFO=YES was specified, no TVI information is returned.
16	Environment	80	LCS External Services unable to establish an ESTAE.

Testing the Eligibility of a Volume

Figure 11 provides the CBRXLCS Assembler H macro syntax that is used to perform the test volume eligibility function.

```
CBRXLCS  TYPE=TAPE
         ,FUNC=TVE
         ,VOLUME=volume-serial-number
         ,UCBPTR=UCB-address
```

Figure 11. CBRXLCS TVE Assembler H Macro Syntax

When an address is requested, the keyword operand may be:
- The name of the field that contains the requested address
- The number, in parentheses, of a general register in the range of 2 through 12 that contains the requested address

Parameter Description

TYPE=TAPE
Specifies a request related to the TCDB.

FUNC=TVE
Specifies a request to check that a volume can be mounted on a specified device.

VOLUME=_volume-serial-number_
Specifies the name of a character variable (six-byte length) that contains the volume serial number of the volume to be tested for mount eligibility. The volume serial number must be left justified in the field and padded on the right with blanks.

UCBPTR=_UCB-address_
Specifies the name of a pointer variable that contains the address of the UCB for the device to be checked for mount capability.

Successful Test Volume Eligibility Processing

The caller of the test volume eligibility function must PIN the UCB before passing UCBPTR. For a complete description of UCB pinning, refer to _OS/390 HCD Planning_.

When the TVE function returns return code 0, the volume specified with the VOLUME keyword is eligible to be mounted on the drive associated with the MVS Unit Control Block specified with the UCBPTR keyword for one of the following reasons:
- Both the volume and the device are defined to the same tape library.
- Neither the volume nor the device are defined to a tape library.

When the TVE function returns return code 4, the request has been processed, but the volume is ineligible to be mounted on the specified drive for one of the following reasons:
- The use attribute of the volume is scratch.
- The volume is not library resident but the device is defined to a tape library.
- The volume is library resident but the device is not defined to the same tape library.

Return Codes for CBRXLCS Test Volume Eligibility

The return code is placed in register 15 and in the LCSPL in field LCSRCODE. The reason code is placed in register 0 and in the LCSPL in field LCSREAS.

Table 8 on page 127 represents the reason codes associated with each of the return codes returned by the test volume eligibility function. See "CBRXLCS Return Codes" on page 132 for more information.

Table 8. Test Volume Eligibility Return and Reason Codes

Return Code	Error Type	Reason Code	Meaning
0	Successful	0	The volume is eligible to be mounted on the device.
4		51	Volume is ineligible because its use attribute is scratch; for example, this is a specific request for a scratch volume.
		52	Volume is ineligible because it is not library resident but the device is defined to a tape library.
		55	Volume is ineligible because it is library resident but the device is not defined to the same tape library.
8	Invalid request	9	Required type parameter not specified.
		11	Invalid value specified for type.
		12	Required function parameter not specified.
		13	Invalid value specified for function.
		16	Required volume parameter not specified.
		17	Invalid volume serial specified.
		18	Required UCB address not specified.
		19	Invalid address specified for UCB.
		29	Invalid parameter address specified for LCSPL.
		30	LCSPL not aligned on fullword boundary.
12	Failure	58	Failure accessing the volume record in TCDB.
		59	Failure accessing library record in TCDB.
		64	Unable to determine in which library the volume resides.
		84	Abend occurred during LCS external services processing.
		310	Media type or recording technology not supported at this software level.
16	Environment	80	LCS external services unable to establish ESTAE.

Exporting Logical Volumes from a VTS

Figure 12 provides the CBRXLCS Assembler H macro syntax that is used to perform the logical volume export function.

```
CBRXLCS  TYPE=TAPE
         ,FUNC=EXPORT
         ,VOLUME=volume-serial-number
         [,CANCEL={YES|NO}]
```

Figure 12. CBRXLCS EXPORT Assembler H Macro Syntax

Required Parameter Description

TYPE=TAPE
   Specifies a request related to the TCDB.

FUNC=EXPORT
   Specifies a request to initiate (or cancel) the export of logical volume from a library.

VOLUME=*volume-serial-number*
> Specifies the name of a character variable (six-byte length) that contains the logical volume serial number of the export list volume to be used for this export operation.

Optional Parameter Description

CANCEL=YES | NO
> CANCEL=YES specifies that the export request currently executing in the library where the specified volume resides be canceled.
>
> CANCEL=NO, or no specification for this optional parameter, indicates that the export request of the logical volume from a library be processed.

Notes on Export Processing

The export function requires that OAM is active, that the library for the export operation is online and operational, and that the cartridge eject installation exit (CBRUXEJC) is not disabled. This environment is necessary for the exported logical volumes to go through completion processing and for the stacked volumes containing the logical volumes to be ejected. Also, only one export operation can be active in a library (VTS) at a time, and an export and import operation are not allowed to execute simultaneously in the same library (VTS).

Return Codes for CBRXLCS EXPORT

The return code is placed in register 15 and in the LCSPL in field LCSRCODE. The reason code is placed in register 0 and in the LCSPL in field LCSREAS.

Table 9 represents the reason codes associated with each of the return codes returned by the export function. These reason codes reflect the scheduling of the export function to the library, not the actual results of the export function. See "CBRXLCS Return Codes" on page 132 for more information.

Table 9. EXPORT Return and Reason Codes

Return Code	Error Type	Reason Code	Meaning
0	Successful	0	Successfully scheduled.
8	Invalid request	9	Required type parameter not specified.
		11	Invalid value specified for type.
		12	Required function parameter not specified.
		13	Invalid value specified for function.
		16	Required volume parameter not specified.
		17	Invalid volume serial specified.
		29	Invalid address specified for LCSPL.
		30	LCSPL not aligned on fullword boundary.
12	Failure	45	Library name as defined in volume record not found in TCDB.
		52	Volume is not library resident.
		58	Failure accessing volume record in TCDB.
		59	Failure accessing library record in TCDB.
		61	Device services failure.

Table 9. EXPORT Return and Reason Codes (continued)

Return Code	Error Type	Reason Code	Meaning
		63	Volume record not found in TCDB.
		70	Volume does not exist in library manager inventory.
		84	Abend occurred during LCS external services processing.
		310	Media type or recording technology not supported at this software level.
		312	Function not compatible with the library.
		313	Volume is currently in use.
		314	Import/Export already in progress or host processing not complete.
		315	Not enough physical drives available in VTS.
		316	Export operation not in progress.
		317	No scratch stacked volume available.
16	Environment	2	OAM control block structure not available.
		80	LCS external services unable to establish ESTAE.
		93	Library is offline, pending offline, or not operational.
		403	Eject processing has been disabled because an error in the eject installation exit has been detected.
		404	OAM address space not available.

Importing Logical Volumes into a VTS

Figure 13 provides the CBRXLCS Assembler H macro syntax that is used to perform the logical volume import function.

```
CBRXLCS  TYPE=TAPE
         ,FUNC=IMPORT
         ,VOLUME=volume-serial-number
         [,CANCEL={YES|NO}]
```

Figure 13. CBRXLCS IMPORT Assembler H Macro Syntax

Required Parameter Description

TYPE=TAPE
Specifies a request related to the TCDB.

FUNC=IMPORT
Specifies a request to initiate (or cancel) the import of a logical volume into a VTS.

VOLUME=_volume-serial-number_
Specifies the name of a character variable (six-byte length) that contains the logical volume serial number of the import list volume to be used for this import operation.

Optional Parameter Description

CANCEL=YES | NO
> CANCEL=YES specifies that the import request currently executing in the library where the specified volume resides be canceled.
>
> CANCEL=NO, or no specification for this optional parameter, indicates that the import request of the logical volume into a VTS be processed.

Notes on Import Processing

The import function requires that OAM is active, that the library for the import operation is online and operational, and that the cartridge entry installation exit (CBRUXENT) is not disabled. This environment is necessary for the imported logical volumes to go through entry processing. An import operation is more restrictive than an export operation in that only one import operation is allowed per physical library, while one export operation is allowed one per logical library (VTS). Also, an import and export operation are not allowed to execute simultaneously in the same library (VTS).

Return Codes for CBRXLCS IMPORT

The return code is placed in register 15 and in the LCSPL in field LCSRCODE. The reason code is placed in register 0 and in the LCSPL in field LCSREAS.

Table 10 represents the reason codes associated with each of the return codes returned by the import function. These reason codes reflect the scheduling (or canceling) of the import function, not the actual results of the import function. See "CBRXLCS Return Codes" on page 132 for more information.

Table 10. IMPORT Return and Reason Codes

Return Code	Error Type	Reason Code	Meaning
0	Successful	0	Successfully scheduled.
8	Invalid request	9	Required type parameter not specified.
		11	Invalid value specified for type.
		12	Required function parameter not specified.
		13	Invalid value specified for function.
		16	Required volume parameter not specified.
		17	Invalid volume serial specified.
		29	Invalid address specified for LCSPL.
		30	LCSPL not aligned on fullword boundary.
12	Failure	45	Library name as defined in volume record not found in TCDB.
		52	Volume is not library resident.
		58	Failure accessing volume record in TCDB.
		59	Failure accessing library record in TCDB.
		61	Device services failure.
		63	Volume record not found in TCDB.
		70	Volume does not exist in library manager inventory.
		84	Abend occurred during LCS external services processing.

Table 10. IMPORT Return and Reason Codes (continued)

Return Code	Error Type	Reason Code	Meaning
		310	Media type or recording technology not supported at this software level.
		312	Function not compatible with the library.
		313	Volume is currently in use.
		314	Import/Export already in progress or host processing not complete.
		315	Not enough physical drives available in VTS.
		316	Import operation not in progress.
		317	No volumes in the import category or no scratch stacked volumes available.
		318	Maximum number of logical volumes defined to library.
16	Environment	2	OAM control block structure not available.
		80	LCS external services unable to establish ESTAE.
		93	Library is offline, pending offline or not operational.
		404	OAM address space not available.

CBRXLCS Assembler Macro Usage

To use the CBRXLCS assembler macro:

1. Include mapping macro CBRLCSPL to provide a DSECT for the LCS External Services parameter list:

    ```
    CBRLCSPL
    ```

2. Create copies of the LCSPL in both static and dynamic storage using the list form of CBRXLCS:

    ```
    CBRXLCS  MF=(L,static-list-name)
    CBRXLCS  MF=(L,dynamic-list-name)
    ```

    Note: No other keywords may be supplied on the list form of CBRXLCS.

3. Initialize the LCSPL by copying the static list form to the dynamic list form.

    Note: Because the length of the LCSPL exceeds 256 bytes, the MVCL instruction must be used for the copy.

4. Set parameter values in the LCSPL, using the modify form of CBRXLCS:

    ```
    CBRXLCS  keywords,
          MF=(M,dynamic-list-name)
    ```

5. Set parameter values in the LCSPL and invoke LCS External Services to perform the requested function, using the execute form of CBRXLCS:

    ```
    CBRXLCS  keywords,
          MF=(E,dynamic-list-name)
    ```

6. To check the completeness and compatibility of the set of parameters supplied on a single invocation of CBRXLCS, specify one of the following:

    ```
    CBRXLCS  keywords,
          MF=(M,dynamic-list-name,COMPLETE)
            or
    CBRXLCS  keywords,
          MF=(E,dynamic-list-name,COMPLETE)
    ```

There is no standard form of CBRXLCS for assembler language.

CBRXLCS Return Codes

The return code from CBRXLCS is placed in register 15 and in the LCSPL in field LCSRCODE. The corresponding reason code is placed in register 0 and in the LCSPL in field LCSREAS.

Note: See the description of each CBRXLCS function for specific return and reason code pairs.

Code	Meaning
0	Successful execution. The request completed or was scheduled successfully.
4	Request completed with warning condition. The reason code identifies the specific cause of the warning.
8	Invalid request. The reason code identifies the specific cause of the invalid parameter condition.
12	Request failed. The reason code identifies the specific cause of the error.
16	Invalid environment. The reason code identifies the specific cause of the error.

CBRXLCS Execution Environment

The following execution environment is required for use by the CBRXLCS macro:
* Task mode.
* Unlocked.
* Noncross memory mode (HASN = PASN = SASN).
* 24-bit or 31-bit addressing mode.
* Primary ASC mode (not AR mode).
* If update of the ICF catalog containing the TCDB is necessary, supervisor state, system key, or SAF/RACF authority is required to perform the update.
* TESTAUTH authorization required.

LCS External Services Parameter List (LCSPL)

The LCS External Services Parameter List (LCSPL), mapped by macro CBRLCSPL, is used to pass parameters to the LCS external services, and to pass return and reason codes and other information back to the caller.

The storage for the LCSPL must be aligned to a fullword boundary. If this is not the case, an error is returned and the requested function is not performed.

Figure 14 on page 133 provides the format of the LCS External Services parameter list.

Note: Fields that are identified as RESERVED FOR IBM USE must not be used by the installation.

```
*-----------------------------------------------------------------------*
*                                                                       *
*          TAPE LIBRARY CONTROL SYSTEM (LCS) PARAMETER LIST             *
*                                                                       *
*-----------------------------------------------------------------------*
        SPACE 1
LCSPL   DSECT ,                       LCS PARAMETER LIST
        SPACE 1
*-----------------------------------------------------------------------*
*                                                                       *
*          CBRXLCS OUTPUT PARAMETERS                                    *
*    (VALUES RETURNED FROM LCS EXTERNAL SERVICES)                       *
*-----------------------------------------------------------------------*
LCSOPARM DS   0F                      CBRXLCS OUTPUT PARAMETER SECTION
LCSLIBNM DS   CL8                     LIBRARY NAME
LCSCONSN DS   CL8                     MTL CONSOLE NAME
         DS   CL8                     RESERVED FOR IBM USE
LCSTVI@  DS   A                       ADDRESS OF TAPE VOLUME INFORMATION,
*                                      MAPPED BY MACRO CBRTVI
         DS   CL4                     RESERVED FOR IBM USE
         DS   A                       RESERVED FOR IBM USE
         DS   A                       RESERVED FOR IBM USE
         DS   A                       RESERVED FOR IBM USE
LCSFLAGS DS   XL1                     OUTPUT FLAGS
LCSATL   EQU  X'80'                   ON IF THE LIBRARY IS AUTOMATED
LCSMTL   EQU  X'40'                   ON IF THE LIBRARY IS MANUAL
         DS   XL3                     RESERVED FOR ALIGNMENT
LCSRCODE DS   F                       CBRXLCS RETURN CODE
LCSREAS  DS   F                       CBRXLCS REASON CODE
         DS   CL8                     RESERVED FOR IBM USE
LCSPOLEN EQU  *-LCSOPARM              LENGTH EQUATE FOR OUTPUT PARMS
*
*-----------------------------------------------------------------------*
*                                                                       *
*          CBRXLCS RETURN CODES                                         *
*    (RETURNED IN REGISTER 15 AND FIELD LCSRCODE UPON                   *
*     COMPLETION OF LCS EXTERNAL SERVICES PROCESSING)                   *
*                                                                       *
*-----------------------------------------------------------------------*
*
LCSSUCC  EQU  0                       SUCCESSFUL EXECUTION
LCSWARN  EQU  4                       REQUEST COMPLETED WITH WARNING
*                                      CONDITION
LCSIREQ  EQU  8                       INVALID REQUEST
LCSFAIL  EQU  12                      REQUEST FAILED
LCSENVIR EQU  16                      INVALID ENVIRONMENT
*
```

Figure 14. The LCS External Services Parameter List—CBRLCSPL (Part 1 of 10)

```
*----------------------------------------------------------------------*
*                                                                      *
*        CBRXLCS INPUT PARAMETERS                                      *
*     (INITIALIZED BY THE CBRXLCS MACRO EXPANSION)                     *
*                                                                      *
*----------------------------------------------------------------------*
LCSIPARM DS    0F                      CBRXLCS INPUT PARAMETER SECTION
LCSFLAG  DS    0BL3                    FLAG BYTES
LCSFLG1  DS    BL1                     FLAG BYTE 1
*        BITS ASSIGNED TO LCSFLG1
LCS_VOLIST    EQU   B'10000000'    VOLUME LIST PARM SPECIFIED
LCS_VOLUME    EQU   B'00100000'    VOLUME PARAMETER SPECIFIED
LCS_SPNUM     EQU   B'00010000'    SUBPOOL PARAMETER SPECIFIED
LCS_UCBPTR    EQU   B'00001000'    UCBPTR PARAMETER SPECIFIED
LCS_USE       EQU   B'00000100'    USE PARAMETER SPECIFIED
LCS_TYPE      EQU   B'00000010'    TYPE PARAMETER SPECIFIED
LCS_FUNC      EQU   B'00000001'    FUNC PARAMETER SPECIFIED
*
LCSFLG2  DS    BL1                     FLAG BYTE 2
*        BITS ASSIGNED TO LCSFLG2
LCS_DEVTYPE   EQU   B'10000000'    DEVICE TYPE PARAMETER SPECIFIED
LCS_GRPNAME   EQU   B'01000000'    STORAGE GROUP NAME PARAMETER
*                                   SPECIFIED
LCS_EXPDATE   EQU   B'00100000'    EXPIRATION DATE PARAMETER
*                                   SPECIFIED
LCS_WRTDATE   EQU   B'00010000'    LAST DATE WRITTEN PARAMETER
*                                   SPECIFIED
LCS_WRTPROT   EQU   B'00001000'    WRITE PROTECTION STATUS PARAMETER
*                                   SPECIFIED
LCS_LIBNAME   EQU   B'00000001'    LIBRARY NAME PARAMETER SPECIFIED
*
LCSFLG3  DS    BL1                     FLAG BYTE 3
*        BITS ASSIGNED TO LCSFLG3
LCS_EXITINFO  EQU   B'10000000'    EXIT INFORMATION PARAMETER
*                                   SPECIFIED
LCS_BULKEJCT  EQU   B'01000000'    BULKEJCT PARAMETER
*                                   SPECIFIED
LCS_EJECTOPT  EQU   B'00100000'    EJECTOPT PARAMETER
*                                   SPECIFIED
LCS_VOLINFO   EQU   B'00000100'    VOLINFO=YES SPECIFIED
LCS_USERID    EQU   B'00000010'    USERID SPECIFIED
LCS_CANCEL    EQU   B'00000001'    CANCEL SPECIFIED
         DS    XL1                     RESERVED FOR ALIGNMENT
*
*----------------------------------------------------------------------*
*                                                                      *
*        CBRXLCS FUNCTION AND FUNCTION TYPES                           *
*                                                                      *
*----------------------------------------------------------------------*
LCSTYPE  DS    XL1                     FUNCTION TYPE
LCSTAPE  EQU   1                       FUNCTION TYPE = TAPE
*
```

Figure 14. The LCS External Services Parameter List—CBRLCSPL (Part 2 of 10)

```
LCSFUNC  DS    XL1                REQUEST FUNCTION
*
LCSTVE   EQU   1                  TEST VOLUME ELIGIBILITY
LCSCUA   EQU   3                  CHANGE USE ATTRIBUTE
LCSMCE   EQU   5                  MANUAL CARTRIDGE ENTRY
LCSQVR   EQU   6                  QUERY VOLUME RESIDENCE
LCSEJECT EQU   7                  EJECT VOLUME
LCSIMPRT EQU   8                  IMPORT
LCSEXPRT EQU   9                  EXPORT
*
*--------------------------------------------------------------------*
*                                                                    *
*   OTHER INPUT PARAMETERS AND CONSTANTS USED TO INITIALIZE THEM     *
*   (INITIALIZED BY THE CBRXLCS MACRO EXPANSION)                     *
*                                                                    *
*--------------------------------------------------------------------*
LCSUSE   DS    XL1                USE ATTRIBUTE TYPE
*        VALUES ASSIGNED TO LCSUSE
LCSPRIV  EQU   1                  USE ATTRIBUTE OF PRIVATE
LCSSCR   EQU   2                  USE ATTRIBUTE OF SCRATCH
*
LCSSPNUM DS    XL1                SUBPOOL NUMBER IN WHICH TO OBTAIN
*                                  STORAGE FOR TAPE VOLUME
*                                  INFORMATION (TVI)
         DS    XL4                RESERVED FOR IBM USE
LCSEXPDT DS    XL4                EXPIRATION DATE
LCSDVTYP DS    A                  POINTER TO THE TAPE DEVICE
*                                  SELECTION INFORMATION
LCSUCB@  DS    A                  UCB ADDRESS FOR TAPE DRIVE WHOSE
*                                  ELIGIBILITY IS TO BE DETERMINED
LCSVOL@  DS    A                  POINTER TO A LIST OF VOLUME
*                                  SERIAL NUMBERS
         DS    A                  RESERVED FOR IBM USE
LCSEXITI DS    XL16               INFORMATION SPECIFIED ON THE
*                                  CBRXLCS MACRO INVOCATION TO BE
*                                  PASSED TO THE INSTALLATION EXIT
LCSUSEID DS    CL8                USERID (FUNCTION EJECT)
*
LCSVOLSR DS    CL6                TAPE VOLUME SERIAL NUMBER
LCSWRTPR DS    CL1                WRITE PROTECTION STATUS
*        VALUES ASSIGNED TO LCSWRTPR
LCSWPYES EQU   C'Y'               WRITE PROTECT STATUS YES
LCSWPNO  EQU   C'N'               WRITE PROTECT STATUS NO
*        DS    CL1                RESERVED FOR IBM USE
*
LCSTRGRP DS    CL8                STORAGE GROUP NAME
         DS    CL8                RESERVED FOR IBM USE
LCSLBNM  DS    CL8                LIBRARY NAME
LCSEJOPT DS    CL1                EJECT OPTION OF KEEP OR PURGE
*        VALUES ASSIGNED TO LCSEJOPT
LCSKEEP  EQU   C'K'               KEEP TCDB RECORD ON EJECT
LCSPURGE EQU   C'P'               PURGE TCDB RECORD ON EJECT
LCSBULK  DS    CL1                EJECT TO BULK OR CONVENIENCE
*                                  OUTPUT STATION FOR ATL
```

Figure 14. The LCS External Services Parameter List—CBRLCSPL (Part 3 of 10)

```
*        VALUES ASSIGNED TO LCSBULK
LCSBLYES EQU   C'Y'                   ATL BULK OUTPUT STATION
LCSBLNO  EQU   C'N'                   ATL CONVENIENCE OUTPUT STATION
         DS    CL6                    RESERVED FOR IBM USE
LCSPILEN EQU   *-LCSIPARM             LENGTH EQUATE FOR INPUT PARMS
*-------------------------------------------------------------------*
*                                                                   *
*        DIAGNOSTIC INFORMATION                                     *
*   (RETURNED FROM LCS EXTERNAL SERVICES)                           *
*                                                                   *
*-------------------------------------------------------------------*
LCSDIAG  DS    0F                     DIAGNOSTIC INFORMATION SECTION
LCSSABCD DS    F                      SYSTEM ABEND CODE
LCSSABRC DS    F                      ABEND REASON CODE
LCSLBSRC DS    F                      RETURN CODE FROM DEVICE SERVICES
LCSLBSRS DS    F                      REASON CODE FROM DEVICE SERVICES
LCSSSIRC DS    F                      RETURN CODE FOR SMS SSI
LCSSMSRC DS    F                      RETURN CODE FROM CONSTRUCT ACCESS
*                                      SERVICES
LCSSMSRS DS    F                      REASON CODE FROM CONSTRUCT ACCESS
*                                      SERVICES
LCSUSRC  DS    F                      RETURN CODE FROM UCBSCAN
LCSUSRS  DS    F                      REASON CODE FROM UCBSCAN
LCSXLIBR DS    F                      RETURN CODE FROM TCDB LIBRARY
*                                      RECORD INQUIRY
LCSXVOLR DS    F                      RETURN CODE FROM TCDB VOLUME
*                                      RECORD INQUIRY
LCSCATRC DS    F                      RETURN CODE FROM CATALOG
LCSCATRS DS    XL2                    REASON CODE FROM CATALOG
         DS    XL2                    RESERVED FOR IBM USE
LCSOAMRC DS    F                      RETURN CODE FROM OAM
LCSOAMRS DS    F                      REASON CODE FROM OAM
*
LCSCATMI DS    CL2                    CATALOG MODULE ID
LCSLBSNF DS    XL1                    FORMAT OF SENSE RECORD CREATED BY
*                                     3490 CONTROL UNIT AFTER I/O ERROR
*                                     BETWEEN HOST AND CONTROL UNIT
LCSLBERA DS    XL1                    ERROR RECOVERY ACTION (ERA) CODE
*                                     RETURNED AFTER FAILURE TO PERFORM
*                                     REQUESTED LIBRARY FUNCTION
LCSLBERM DS    XL1                    ERROR MODIFIER CODE ASSOCIATED WITH
*                                     THE ERA CODE
LCSFCCW  DS    XL1                    FAILING COMMAND CODE  (CCW)
LCSIOST  DS    XL2                    SUBCHANNEL STATUS INFORMATION,
*                                     INCLUDES DEVICE STATUS FOLLOWED BY
*                                     SUBCHANNEL STATUS
         DS    CL4                    RESERVED FOR IBM USE
LCSPDLEN EQU   *-LCSDIAG              LENGTH EQUATE FOR DIAGNOSTIC
*                                     SECTION
```

Figure 14. The LCS External Services Parameter List—CBRLCSPL (Part 4 of 10)

```
*-------------------------------------------------------------------*
*                                                                   *
*       LCSPL EXPANSION AREA                                        *
*                                                                   *
*-------------------------------------------------------------------*
LCSEXP   DS    0F                    EXPANSION AREA
         DS    CL40                  RESERVED FOR IBM USE
         DS    CL40                  RESERVED FOR IBM USE
         DS    CL40                  RESERVED FOR IBM USE
LCSPELEN EQU   *-LCSEXP              LENGTH EQUATE FOR EXPANSION
*-------------------------------------------------------------------*
*                                                                   *
*       CBRXLCS VOLUME LIST MAPPING                                 *
*  (TO BE INITIALIZED BY THE CALLER AND PROVIDED AS INPUT FOR A     *
*   REQUEST TO ENTER A LIST OF VOLUMES INTO A MANUAL TAPE LIBRARY   *
*                                                                   *
*-------------------------------------------------------------------*
LCSV     DSECT                       (POINTED TO BY LCSVOL@)
LCSVBUF  DS    F                     TOTAL LENGTH OF VOLUME LIST
*                                      (HEADER  + LIST)
LCSVCNT  DS    F                     NUMBER OF VOLUMES IN THE LIST
LCSVLEN  DS    F                     LENGTH OF A VOLUME ENTRY
LCSVADDR DS    A                     POINTER TO FIRST ENTRY
LCSMLIST DSECT                       (POINTED TO BY LCSVADDR FOR AN
*                                      MCE REQUEST)
LCSMVOL  DS    CL6                   LEFT JUSTIFIED, RIGHT PADDED
         DS    CL6                   RESERVED FOR IBM USE
LCSMTDSI DS    0F                    TAPE DEVICE SELECTION INFORMATION
*                                      (TDSI) FOR THIS VOLUME
LCSMREC  DS    XL1                   TAPE RECORDING TECHNOLOGY
LCSMMED  DS    XL1                   MEDIA TYPE
LCSMCOMP DS    XL1                   COMPACTION
LCSMSPEC DS    XL1                   SPECIAL ATTRIBUTE
LCSMRET  DS    F                     RETURN CODE FOR VOLUME
LCSMREAS DS    F                     REASON CODE FOR VOLUME
*-------------------------------------------------------------------*
*                                                                   *
*       CBRXLCS REASON CODES                                        *
*   (RETURNED IN REGISTER 0 AND FIELD LCSREAS UPON                  *
*    COMPLETION OF LCS EXTERNAL SERVICES PROCESSING,               *
*    AND FIELD LCSMREAS FOR AN MCE REQUEST.)                        *
*                                                                   *
*-------------------------------------------------------------------*
LCSGOOD  EQU   0                     SUCCESSFUL EXECUTION
LCSOAMNA EQU   2                     OAM CONTROL BLOCKS NOT AVAILABLE
LCSWNMNT EQU   3                     VOLUME NOT ELIGIBLE FOR MOUNT ON
*                                      THIS DEVICE
```

Figure 14. The LCS External Services Parameter List—CBRLCSPL (Part 5 of 10)

```
LCSWVAS  EQU   4                        VOLUME ALREADY SCRATCH
LCSWVAP  EQU   5                        VOLUME ALREADY PRIVATE
LCSCUADS EQU   6                        CUA PROCESSING DISABLED
LCSNOCUV EQU   7                        CUA PROCESSING NOT PERFORMED
*                                        FOR THIS VOLUME PER INSTALLATION
*                                        EXIT REQUEST
LCSWSTMP EQU   8                        SCRATCH VOLUME THRESHOLD MESSAGE
*                                        PROCESSING WAS NOT COMPLETED
*                                        SUCCESSFULLY
LCSIRTYP EQU   9                        REQUIRED TYPE PARAMETER NOT
*                                        SPECIFIED
LCSIRMEX EQU   10                       MUTUALLY EXCLUSIVE REQUIRED
*                                        PARAMETERS SPECIFIED
LCSITYPE EQU   11                       INVALID TYPE VALUE SPECIFIED
LCSIRFUN EQU   12                       REQUIRED FUNC PARAMETER NOT
*                                        SPECIFIED
LCSIFUNC EQU   13                       INVALID FUNC VALUE
LCSIRUSE EQU   14                       REQUIRED USE PARAMETER NOT
*                                        SPECIFIED
LCSIUSE  EQU   15                       INVALID USE VALUE
LCSIRVOL EQU   16                       REQUIRED VOLUME PARAMETER NOT
*                                        SPECIFIED
LCSIVOL  EQU   17                       INVALID VOLUME VALUE
LCSIRUCB EQU   18                       REQUIRED UCBPTR NOT SPECIFIED
LCSIUCB  EQU   19                       INVALID UCBPTR VALUE SPECIFIED
LCSIRLST EQU   20                       REQUIRED VOLLIST NOT SPECIFIED
LCSIVL   EQU   21                       INVALID VOLUME LIST VALUE
LCSISGL  EQU   22                       INVALID VALUE IN STORAGE GROUP LIST
*                                         HEADER
LCSIRLBN EQU   23                       REQUIRED LIBRARY NAME NOT SPECIFIED
LCSIEXPD EQU   25                       INVALID EXPIRATION DATE VALUE
LCSILBND EQU   26                       LIBRARY NOT DEFINED TO STORAGE
*                                        GROUP
LCSILBNM EQU   27                       INVALID LIBRARY NAME SPECIFIED
LCSIWPS  EQU   28                       INVALID WRITE PROTECT STATUS VALUE
LCSIBADR EQU   29                       INVALID PARAMETER ADDRESS
LCSIWDBD EQU   30                       ADDRESS NOT ON WORD BOUNDARY
*                                        OR LEVEL
LCSIRTDS EQU   31                       REQUIRED TAPE DEVICE SELECTION
*                                        INFORMATION (TDSI) NOT SPECIFIED
LCSIRLID EQU   32                       REQUIRED LIBRARY ID NOT SPECIFIED
LCSILID  EQU   33                       INVALID VALUE SPECIFIED FOR LIBRARY
*                                        ID
LCSISGNM EQU   34                       INVALID STORAGE GROUP NAME
LCSIRMED EQU   35                       REQUIRED MEDIA TYPE NOT SPECIFIED
*                                        FOR MCE VOLUME
```

Figure 14. The LCS External Services Parameter List—CBRLCSPL (Part 6 of 10)

```
LCSICOMP EQU   38                    INVALID COMPACTION SPECIFIED
*                                     IN TDSI
LCSISPEC EQU   39                    INVALID SPECIAL ATTRIBUTE SPECIFIED
*                                     IN TDSI
LCSIATDC EQU   41                    AMBIGUOUS TDSI COMBINATION
LCSITDNA EQU   42                    TAPE DEVICE SELECTION VALUE
*                                     SPECIFIED WHERE NOT ALLOWED OR
*                                     NOT APPLICABLE
LCSITDSP EQU   43                    INVALID POINTER TO TDSI SPECIFIED
*        REASON CODES ASSOCIATED WITH RETURN CODES
*          LCSFAIL (12) AND LCSENVIR (16)
LCSFLUNK EQU   45                    LIBRARY NAME AS DEFINED IN VOLUME
*                                     RECORD NOT FOUND IN TCDB
LCSFVSCR EQU   51                    SPECIFIC VOLSER REQUEST FOR A
*                                     SCRATCH VOLUME
LCSFNLRS EQU   52                    VOLUME RESIDES OUTSIDE LIBRARY
LCSFNLCB EQU   53                    LIBRARY FOR SPECIFIED VOLUME NOT
*                                     DEFINED TO SMS CONFIGURATION
LCSFNTSG EQU   54                    SMS STORAGE GROUP WAS
*                                     NOT OF TYPE TAPE
LCSFDNRV EQU   55                    REQUESTED DEVICE DOES NOT RESIDE IN
*                                     SAME LIBRARY AS REQUESTED
*                                     VOLUME
LCSFNLSG EQU   56                    NO LIBRARIES ASSOCIATED WITH LIST
*                                     OF STORAGE GROUPS
LCSFXVOL EQU   58                    FAILURE ACCESSING THE VOLUME RECORD
*                                     IN THE CATALOG
LCSFXLIB EQU   59                    FAILURE ACCESSING THE LIBRARY
*                                     RECORD IN THE CATALOG
LCSFCASV EQU   60                    FAILURE ACCESSING THE SMS STORAGE
*                                     GROUP CONSTRUCTS
LCSFLBSV EQU   61                    FAILURE ACCESSING HARDWARE
*                                     CONFIGURATION INFORMATION
LCSFLIBN EQU   62                    SPECIFIED LIBRARY IS NOT DEFINED
*                                     TO ACTIVE SMS CONFIGURATION
LCSNOVR  EQU   63                    VOLUME RECORD NOT FOUND FOR THE
*                                     REQUESTED VOLUME
LCSNOLR  EQU   64                    LIBRARY RECORD NOT FOUND IN TCDB
*                                     FOR REQUESTED LIBRARY
LCSFLNDF EQU   65                    LIBRARY LOGICAL TYPE NOT DEFINED
*                                     IN ACTIVE CONFIGURATION
LCSFVNIL EQU   70                    VOLUME NOT FOUND IN LIBRARY MANAGER
*                                     INVENTORY
LCSFFULL EQU   72                    REQUEST FAILED BECAUSE ALL LIBRARY
*                                     CELLS ARE FULL
LCSFDUPV EQU   74                    REQUEST FAILED BECAUSE VOLUME
*                                     SERIAL NUMBER ALREADY EXISTS IN
*                                     LIBRARY MANAGER INVENTORY
LCSFUCBS EQU   75                    UNEXPECTED UCBSCAN ERROR
*                                     ENCOUNTERED DURING PROCESSING
LCSFLBEN EQU   76                    LIBSERV FAILURE WHEN ATTEMPTING TO
*                                     ENTER VOLUME INTO MANUAL TAPE
*                                     LIBRARY
```

Figure 14. The LCS External Services Parameter List—CBRLCSPL (Part 7 of 10)

```
LCSFLBEJ EQU   77                      LIBSERV FAILURE WHEN ATTEMPTING TO
*                                       EJECT VOLUME FROM MANUAL TAPE
*                                       LIBRARY
LCSFXVRV EQU   78                      ERROR ATTEMPTING TO RETRIEVE
*                                       VOLUME RECORD
LCSFXVUP EQU   79                      ERROR ATTEMPTING TO WRITE VOLUME
*                                       RECORD
LCSESTAY EQU   80                      ESTAE ROUTINE NOT ESTABLISHED
LCSEGETF EQU   81                      GETMAIN FAILED FOR DEVICE POOL
*                                       NAMES LIST OR LOCAL WORKING
*                                       STORAGE
LCSEXITF EQU   82                      ABNORMAL TERMINATION OCCURRED
*                                       DURING INSTALLATION EXIT
*                                       (CBRUXCUA) EXECUTION
LCSXINVD EQU   83                      INVALID RETURN CODE OR BAD DATA
*                                       RETURNED FROM THE CHANGE USE
*                                       ATTRIBUTE INSTALLATION EXIT
*                                       (CBRUXCUA)
LCSEABND EQU   84                      ABNORMAL TERMINATION OCCURRED
*                                       DURING EXECUTION
LCSENDIS EQU   90                      CARTRIDGE ENTRY PROCESSING HAS
*                                       BEEN DISABLED
LCSENSUS EQU   91                      CARTRIDGE ENTRY PROCESSING HAS
*                                       BEEN SUSPENDED FOLLOWING ERROR
*                                       INVOKING INSTALLATION EXIT
LCSNOTMT EQU   92                      LIBRARY FOR MCE NOT MANUAL TAPE
*                                       LIBRARY
LCSLBOFF EQU   93                      LIBRARY OFFLINE, PENDING OFFLINE,
*                                       OR NOT OPERATIONAL
LCSINLIB EQU   94                      VOLUME FOR MCE ALREADY RESIDES
*                                       IN ANOTHER TAPE LIBRARY
LCSXVETO EQU   95                      INSTALLATION EXIT VETOED ENTRY
*                                       OF VOLUME INTO LIBRARY
LCSXIGNR EQU   96                      VOLUME NOT ENTERED INTO MTL
*                                       BECAUSE INSTALLATION EXIT
*                                       SAID TO IGNORE THE VOLUME
LCSDASDV EQU   97                      VOLUME OF SAME VOLSER IS KNOWN DASD
*                                       VOLUME
*
*    ADDITIONAL REASON CODES ASSOCIATED WITH RETURN CODE
*    LCSWARN(4)
*
LCSNTMNT EQU   120                      VOLUME IS INELIGIBLE BECAUSE
*                                        THE TYPE OF MEDIA DEFINED IN
*                                        THE VOLUME RECORD MAY NOT BE
*                                        MOUNTED ON SPECIFIED DEVICE
LCSMMISM EQU   121                      VOLUME IS INELIGIBLE BECAUSE
*                                        THE TYPE OF MEDIA DEFINED IN
*                                        THE TDSI DOES NOT MATCH MEDIA
*                                        DEFINED ON THE VOLUME RECORD
```

Figure 14. The LCS External Services Parameter List—CBRLCSPL (Part 8 of 10)

```
LCSVERST EQU  122                         VOLUME IS INELIGIBLE BECAUSE
*                                           THE VOLUME RECORD REFLECTS AN
*                                           ERROR STATUS
LCSRTNMT EQU  123                         VOLUME IS INELIGIBLE BECAUSE THE
*                                           SPECIFIED RECORDING TECHNOLOGY
*                                           IS INCOMPATIBLE WITH THE VOLUME
*                                           MEDIA TYPE OR THE SPECIFIED
*                                           DRIVE TYPE
LCSSAMEL EQU  130                         MCE PROCESSING PERFORMED FOR
*                                           VOLUME WHICH ALREADY HAD TCDB
*                                           VOLUME RECORD. TCDB UPDATED,
*                                           IF NECESSARY
LCSWLNOP EQU  131                         SCRATCH VOLUME THRESHOLD PROCES-
*                                           SING NOT PERFORMED BECAUSE
*                                           LIBRARY WAS NOT OPERATIONAL
LCSWNSCT EQU  132                         DELETED WITH 3590 SUPPORT
LCSWNULR EQU  133                         DELETED WITH 3590 SUPPORT
LCSWLMIO EQU  134                         NO TCDB RECORD BUT VOLUME RESIDES
*                                           IN SPECIFIED LIBRARY
LCSWMSLM EQU  135                         LIBRARY MISMATCH, VOLUME RESIDES
*                                           IN SPECIFIED LIBRARY
LCSWMSNF EQU  136                         LIBRARY MISMATCH, VOLUME NOT FOUND
*                                           IN SPECIFIED LIBRARY
LCSWMSLF EQU  137                         LIBRARY MISMATCH, UNABLE TO ACCESS
*                                           SPECIFIED LIBRARY
*    ADDITIONAL REASON CODES ASSOCIATED WITH RETURN CODE
*    LCSIREQ(8)
*
LCSEJCTD EQU  201                         VOLUME ALREADY EJECTED
LCSEJEJO EQU  202                         INVALID VALUE FOR EJECT OPTION
LCSEJBLK EQU  203                         INVALID VALUE FOR BULK EJECT
LCSIUSER EQU  204                         INVALID TSO USERID SPECIFIED
LCSBADRT EQU  215                         NOT ALL VOLUMES HAVE THE SAME
*                                           RECORDING TECHNOLOGY
*
*    ADDITIONAL REASON CODES ASSOCIATED WITH RETURN CODE
*    LCSFAIL(12)
*
LCSEJABD EQU  300                         OAM ABEND DURING EJECT REQUEST
LCSEJPND EQU  302                         EJECT REQUEST ALREADY PENDING
*                                           FOR VOLUME
LCSEJUSE EQU  303                         UNABLE TO MAKE USER ADDRESS SPACE
*                                           NONSWAPPABLE
LCSEJTCD EQU  304                         TCDB ACCESS ERROR IN OAM
LCSEJTCA EQU  305                         TCDB AUTHORIZATION ERROR IN OAM
LCSEJOAM EQU  306                         OAM INTERNAL ERROR
LCSEJVOL EQU  307                         VOLSER NOT IN TCDB
LCSFNSUP EQU  310                         MEDIA TYPE OR RECORDING TECHNOLOGY
*                                           NOT SUPPORTED AT THIS SOFTWARE
*                                           LEVEL
LCSFNSML EQU  311                         MEDIA TYPE AND RECORDING TECHNOLOGY
*                                           NOT SUPPORTED IN MTL
```

Figure 14. The LCS External Services Parameter List—CBRLCSPL (Part 9 of 10)

```
              LCSFNCOM EQU  312                   FUNCTION NOT COMPATIBLE WITH
              *                                      THE LIBRARY
              LCSFVINU EQU  313                   VOLUME IS CURRENTLY IN USE
              LCSFSEQK EQU  314                   IMPORT/EXPORT ALREADY IN
              *                                   PROGRESS OR HOST PROCESSING
              *                                   NOT COMPLETE
              LCSFNEDR EQU  315                   NOT ENOUGH PHYSICAL DRIVES AVAIL-
              *                                      ABLE IN VTS
              LCSFMXNX EQU  316                   IMPORT/EXPORT NOT IN PROGRESS
              LCSFMTCT EQU  317                   EMPTY CATEGORY
              *                                      IMPORT: NO IMPORT VOLUMES
              *                                      EXPORT/IMPORT: NO SCRATCH VOLUMES
              LCSFLFUL EQU  318                   MAXIMUM LOGICALS DEFINED TO LIBRARY
              LCSFNRNF EQU  319                   NO TCDB RECORD AND VOLUME NOT FOUND
              *                                    IN SPECIFIED LIBRARY
              LCSFNRLF EQU  320                   NO TCDB RECORD AND UNABLE TO ACCESS
              *                                     SPECIFIED LIBRARY
              *
              *
              *    ADDITIONAL REASON CODES ASSOCIATED WITH RETURN CODE
              *    LCSENVIR(16)
              *
              LCSEJNUL EQU  400                   OAM INITIALIZED WITH NULL
              *                                   CONFIGURATION
              LCSEJLIB EQU  401                   LIBRARY NOT ACCESSIBLE, OFFLINE,
              *                                    OR NOT OPERATIONAL
              LCSEJVIS EQU  402                   VISION SYSTEM NOT OPERATIONAL
              LCSEJXAB EQU  403                   EJECT PROCESSING DISABLED BECAUSE
              *                                    AN ERROR IN THE EJECT INSTALLATION
              *                                    EXIT (CBRUXEJC) HAS BEEN DETECTED
              LCSEJNAV EQU  404                   OAM ADDRESS SPACE NOT AVAILABLE
              LCSNOOAM EQU  404                   OAM ADDRESS SPACE NOT AVAILABLE
              *
```

Figure 14. The LCS External Services Parameter List—CBRLCSPL (Part 10 of 10)

Tape Volume Information

Tape volume information (TVI), mapped by macro CBRTVI, is used to pass
information from both the TCDB and the library manager inventory about the
volume specified on a CBRXLCS query volume residence request. Figure 15 on
page 143 gives the format for the tape volume information.

```
      ***********************************************************************
      *                                                                     *
      *          TAPE VOLUME INFORMATION MAPPING                            *
      *                                                                     *
      ***********************************************************************
              SPACE 1
      TVI     DSECT ,
              SPACE 1
      ***********************************************************************
      *                                                                     *
      *          HEADER                                                     *
      *                                                                     *
      ***********************************************************************
      TVIHDR  DS    0F          TVI HEADER
      TVIID   DS    CL4         TVI IDENTIFIER EBCDIC 'TVI '
      TVILENG DS    F           LENGTH OF TVI
      TVIVER  DS    XL1         VERSION OF TVI
      TVIREV  DS    XL1         REVISION LEVEL OF TVI
      TVISPNUM DS   XL1         SUBPOOL IN WHICH TVI WAS OBTAINED
              DS    XL1         RESERVED FOR IBM USE
              DS    F           RESERVED FOR IBM USE
      ***********************************************************************
      *                                                                     *
      *          VOLUME SERIAL                                              *
      *                                                                     *
      ***********************************************************************
      TVIVOLSR DS   CL6          VOLUME SERIAL NUMBER
      ***********************************************************************
      *          VOLUME INFORMATION FROM THE TCDB                          *
      *                                                                     *
      *  NOTE:   LIBRARY NAME AND CONSOLE NAME ARE RETURNED IN THE LCSPL   *
      *              - LIBRARY NAME IN FIELD LCSLIBNM                       *
      *              - CONSOLE NAME IN FIELD LCSCONSN                       *
      *                                                                     *
      * IF THE LIBRARY NAME IS SPECIFIED ON THE QVR INVOCATION, LCSLIBNM   *
      * CONTAINS THE SPECIFIED LIBRARY AND LCSCONSN CONTAINS THE CONSOLE   *
      * NAME OF THE SPECIFIED LIBRARY.  THE SPECIFIED LIBRARY NAME MAY     *
      * OR MAY NOT MATCH THE LIBRARY NAME IN THE VOLUME RECORD, TVILIBNM.  *
      *                                                                     *
      * IF THE LIBRARY NAME IS NOT SPECIFIED ON THE QVR INVOCATION,        *
      * LCSLBNM CONTAINS THE LIBRARY NAME FOUND IN THE VOLUME RECORD,      *
      * TVILIBNM, IF THE VOLUME RECORD IS FOUND.                           *
      * LCSCONSN CONTAINS THE CONSOLE NAME OF TVILIBNM, IF THE VOLUME      *
      * RECORD IS FOUND.                                                   *
      *                                                                     *
      *          INCLUDE MAPPING MACRO CBRVERR TO DEFINE CONSTANTS         *
      *          FOR THE VALUES ASSIGNED TO (TVIERROR).                    *
```

Figure 15. The Tape Volume Information Assembler Mapping—CBRTVI (Part 1 of 4)

```
        ********************************************************************
TVIUSEA DS    CL1         VOLUME USE ATTRIBUTE AS DEFINED IN
*                         THE TAPE VOLUME RECORD
*                           'P' FOR PRIVATE
*                           'S' FOR SCRATCH
        DS    XL1         RESERVED FOR IBM USE
TVITDSI DS    0F          TAPE DEVICE SELECTION INFORMATION
TVIREC  DS    XL1           RECORDING TECHNOLOGY
TVIMEDIA DS   XL1           MEDIA TYPE
TVICOMP DS    XL1           COMPACTION INDICATOR
TVISPEC DS    XL1           SPECIAL ATTRIBUTE
TVIERROR DS   H           VOLUME ERROR STATUS
        DS    XL2         RESERVED FOR IBM USE
TVISTGRP DS   CL8         STORAGE GROUP NAME
TVIWPROT DS   CL1         WRITE PROTECTION STATUS
*                           'Y' FOR WRITE-PROTECTED
*                           'N' FOR NOT WRITE-PROTECTED
*                           ' ' BLANK FOR UNKNOWN STATUS
TVICHKPT DS   CL1         CHECKPOINT VOLUME INDICATOR
*                           'Y' FOR CHECKPOINT VOLUME
*                           'N' FOR NOT CHECKPOINT VOLUME
*                           ' ' BLANK FOR UNKNOWN STATUS
TVILOC  DS    CL1         VOLUME LOCATION CODE
*                           'L' FOR LIBRARY-RESIDENT
*                           'S' FOR SHELF-RESIDENT
        DS    CL1         RESERVED FOR IBM USE
TVISHLOC DS   CL32        SHELF LOCATION
TVIOWNER DS   CL64        VOLUME OWNER INFORMATION
TVICREAT DS   CL10        VOLUME RECORD CREATION DATE
TVIENTEJ DS   CL10        LAST ENTRY OR EJECTION DATE
TVIMOUNT DS   CL10        LAST MOUNTED DATE
TVIWRITE DS   CL10        LAST WRITTEN DATE
TVIEXPIR DS   CL10        VOLUME EXPIRATION DATE
TVILIBNM DS   CL8         LIBRARY NAME FROM VOLUME RECORD
        DS    CL2         RESERVED FOR IBM USE
        DS    CL56        RESERVED FOR IBM USE
        ********************************************************************
        *                                                                *
        *        VOLUME INFORMATION FROM LIBRARY MANAGER                 *
        *                                                                *
        ********************************************************************
TVILCAT DS    CL2         VOLUME CATEGORY FROM LIBRARY MANAGER
*                           (CONSTANTS FOR CATEGORIES ASSIGNED TO
*                           TVILCAT ARE DECLARED LATER IN MACRO)
TVIMEDTY DS   XL1         VOLUME MEDIA TYPE
*                           X'00' FOR UNKNOWN
*                           X'01' FOR MEDIA1
*                           X'02' FOR MEDIA2
*                           X'03' FOR MEDIA3
*                           X'04' FOR MEDIA4
```

Figure 15. The Tape Volume Information Assembler Mapping—CBRTVI (Part 2 of 4)

```
TVIATTR  DS    XL1          VOLUME ATTRIBUTE
*                             0 PHYSICAL NON-VTS VOLUME
*                             1 LOGICAL VTS VOLUME
*                             2 VTS LOGICAL VOLUME BEING IMPORTED
*                             3 PHYSICAL VTS VOLUME
TVISTAT  DS    0BL2
TVISTAT1 DS    BL1          VOLUME STATUS - BYTE 1
TVIINACC EQU   B'10000000'  VOLUME IS IN LIBRARY BUT INACCESSIBLE
TVIMNT   EQU   B'01000000'  VOLUME IS MOUNTED
TVIMNTQ  EQU   B'00100000'  VOLUME IS QUEUED FOR MOUNT
TVIMNTIP EQU   B'00010000'  VOLUME IN PROCESS OF BEING MOUNTED
TVIDMNTQ EQU   B'00001000'  VOLUME QUEUED FOR DEMOUNT
TVIDMNTP EQU   B'00000100'  VOLUME IN PROCESS OF BEING DEMOUNTED
TVIEJCQ  EQU   B'00000010'  VOLUME IS QUEUED FOR EJECT/EXPORT
TVIEJCIP EQU   B'00000001'  VOLUME IN PROCESS OF BEING EJECTED/EXPORTED
*
TVISTAT2 DS    BL1          VOLUME STATUS - BYTE 2
TVIAUDQ  EQU   B'10000000'  VOLUME QUEUED FOR AUDIT
TVIAUDIP EQU   B'01000000'  VOLUME IN PROCESS OF BEING AUDITED
TVIMISS  EQU   B'00100000'  VOLUME IS MISPLACED
TVIBLAB  EQU   B'00010000'  VOLUME HAS UNREADABLE OR NO LABEL
TVIUMAN  EQU   B'00001000'  VOLUME WAS USED DURING MANUAL MODE
TVIMANEJ EQU   B'00000100'  VOLUME WAS MANUALLY EJECTED
*
         DS    H            RESERVED FOR IBM USE
         DS    CL24         RESERVED FOR IBM USE
         DS    0D           END OF VTI
TVILNGTH EQU   *-TVI
         SPACE 1
*********************************************************************
*   TCDB USE ATTRIBUTE CONSTANTS                                   *
*********************************************************************
TVIPRIV  EQU   C'P'         PRIVATE USE ATTRIBUTE
TVISCRT  EQU   C'S'         SCRATCH USE ATTRIBUTE
         SPACE 1
*********************************************************************
*   TCDB TAPE DEVICE SELECTION INFORMATION CONSTANTS              *
*********************************************************************
*        CONSTANTS TO DEFINE RECORDING TECHNOLOGY
TVINOREC    EQU 0           RECORDING TECHNOLOGY UNKNOWN OR
*                             UNSPECIFIED
TVI18TRK    EQU 1           READ/WRITE ON  18 TRACK DEVICE
TVI36TRK    EQU 2           READ/WRITE ON  36 TRACK DEVICE
TVI128TRK   EQU 3           READ/WRITE ON 128 TRACK DEVICE
TVI256TRK   EQU 4           READ/WRITE ON 256 TRACK DEVICE
*        CONSTANTS TO DEFINE MEDIA TYPE
TVINOMED EQU   0            MEDIA TYPE UNKNOWN OR UNSPECIFIED
TVIMED1  EQU   1            MEDIA1 - CARTRIDGE SYSTEM TAPE
TVIMED2  EQU   2            MEDIA2 - ENHANCED CAPACITY CARTRIDGE
*                              SYSTEM TAPE
TVIMED3  EQU   3            MEDIA3 - HIGH PERFORMANCE CARTRIDGE TAPE
TVIMED4  EQU   4            MEDIA4 - EXTENDED HIGH PERFORMANCE
*                              CARTRIDGE TAPE
```

Figure 15. The Tape Volume Information Assembler Mapping—CBRTVI (Part 3 of 4)

```
*        CONSTANTS TO DEFINE COMPACTION
*    (TVIIDRC AND TVICOMPT CAN BE USED INTERCHANGEABLY)
TVICMPNS EQU   0              COMPACTION UNKNOWN OR NOT SET
TVMNOCMP EQU   1              NO COMPACTION
TVIIDRC  EQU   2              COMPACTION
TVICOMPT EQU   2              COMPACTION
*        CONSTANTS TO DEFINE SPECIAL ATTRIBUTE
TVINOSPC EQU   0              VOLUME HAS NO SPECIAL ATTRIBUTE
TVIRDCOM EQU   1              VOLUME WILL BE MOUNTED FOR READ ONLY
*                              ALL READ-COMPATIBLE DEVICES MAY BE
*                              SELECTED
**********************************************************************
*   VOLUME ATTRIBUTE CONSTANTS                                      *
**********************************************************************
TVIPHYCL EQU   0              PHYSICAL NON-VTS VOLUME
TVILOGCL EQU   1              LOGICAL VTS VOLUME
TVIMPORT EQU   2              VTS LOGICAL VOLUME BEING IMPORTED
TVISTKED EQU   3              PHYSICAL VTS VOLUME
*
**********************************************************************
*   MISCELLANEOUS SOFTWARE CONSTANTS                                *
**********************************************************************
TVIYES   EQU   C'Y'           YES
TVINO    EQU   C'N'           NO
TVIBLANK EQU   C' '           BLANK
*
**********************************************************************
*   LIBRARY MANAGER CATEGORY CONSTANTS FOR TVILCAT                  *
**********************************************************************
TVISCRM1 EQU   C'S1'          VOLUME IS MEDIA1 SCRATCH
TVISCRM2 EQU   C'S2'          VOLUME IS MEDIA2 SCRATCH
TVISCRM3 EQU   C'S3'          VOLUME IS MEDIA3 SCRATCH
TVISCRM4 EQU   C'S4'          VOLUME IS MEDIA4 SCRATCH
TVIERRC  EQU   C'ER'          VOLUME IS IN ERROR CATEGORY
TVIPRIVC EQU   C'PR'          VOLUME IS IN PRIVATE CATEGORY
TVIINSRT EQU   C'IN'          VOLUME IS IN INSERT CATEGORY
TVICNVEJ EQU   C'CE'          VOLUME IS IN CONVENIENCE EJECT CATEGORY
TVIBLKEJ EQU   C'BE'          VOLUME IS IN BULK EJECT CATEGORY
TVIPURGE EQU   C'PG'          VOLUME IS IN PURGE CATEGORY
TVIMEJCT EQU   C'ME'          VOLUME IS IN MANUAL EJECT CATEGORY
TVIIMPRT EQU   C'IM'          VOLUME IS IN IMPORT CATEGORY
*                              (PHYSICAL VOLUMES CONTAINING LOGICAL
*                               VOLUMES TO IMPORT)
TVIIMPND EQU   C'IP'          VOLUME IS IN IMPORT PENDING CATEGORY
TVIEXPND EQU   C'XP'          VOLUME IS IN EXPORT PENDING CATEGORY
TVIEXPTD EQU   C'XD'          VOLUME IS IN EXPORTED CATEGORY
TVISTAKD EQU   C'ST'          VOLUME IS IN STACKED VOLUME CATEGORY
*                              (PHYSICAL VOLUMES THAT VTS MANAGES)
TVIUNASN EQU   C'UA'          VOLUME IS IN UNASSIGNED CATEGORY
TVIEXPHD EQU   C'EH'          VOLUME IS IN EXPORT HOLD CATEGORY
TVIUNK   EQU   C'UN'          VOLUME CATEGORY IS NOT KNOWN
**********************************************************************
*        HEADER CONSTANTS                                           *
**********************************************************************
TVIIDC   EQU   C'TVI '        TVI IDENTIFIER
TVIVERV  EQU   1              VERSION
TVIREVV  EQU   5              REVISION LEVEL
.END     MEND     */
```

Figure 15. The Tape Volume Information Assembler Mapping—CBRTVI (Part 4 of 4)

Tape Device Selection Information

Tape device selection information (TDSI), mapped by macro CBRTDSI, is used to pass device selection information to and among system components providing tape

library support. Figure 16 gives the format for Tape Device Selection Information.

```
*---------------------------------------------------------------------*
*             TAPE DEVICE SELECTION INFORMATION                       *
*---------------------------------------------------------------------*
TDSI     DSECT ,               TAPE DEVICE SELECTION INFORMATION
*
*---------------------------------------------------------------------
TDSDEVT DS    0F
TDSREC  DS    XL1              RECORDING TECHNOLOGY
TDSMEDIA DS   XL1              MEDIA TYPE
TDSCOMP DS    XL1              COMPACTION TYPE
TDSSPEC DS    XL1              SPECIAL ATTRIBUTES
*---------------------------------------------------------------------*
*               CONSTANT FOR DONTCARE OR ZERO                         *
*        ZERO, OR TDSNOCAR, IS AN ACCEPTABLE VALUE FOR TDSI.          *
*---------------------------------------------------------------------*
TDSNOCAR EQU   0
*---------------------------------------------------------------------*
*         CONSTANTS TO DEFINE RECORDING TECHNOLOGY                    *
*---------------------------------------------------------------------*
TDSNOREC   EQU   0            RECORDING TECHNOLOGY UNKNOWN OR
*                             UNSPECIFIED
TDS18TRK   EQU   1            READ/WRITE ON  18 TRACK DEVICE
TDS36TRK   EQU   2            READ/WRITE ON  36 TRACK DEVICE
TDS128TRK  EQU   3            READ/WRITE ON 128 TRACK DEVICE
TDS256TRK  EQU   4            READ/WRITE ON 256 TRACK DEVICE
*---------------------------------------------------------------------*
*         CONSTANTS TO DEFINE MEDIA TYPE                              *
*---------------------------------------------------------------------*
TDSNOMED EQU   0              MEDIA TYPE UNKNOWN OR UNSPECIFIED
TDSMED1  EQU   1              MEDIA1 - CARTRIDGE SYSTEM TAPE
TDSMED2  EQU   2              MEDIA2 - ENHANCED CAPACITY
*                              CARTRIDGE SYSTEM TAPE
TDSMED3  EQU   3              MEDIA3 - HIGH PERFORMANCE CARTRIDGE
*                               TAPE
TSDMED4  EQU   4              MEDIA4 - EXTENDED HIGH PERFORMANCE
*                               CARTRIDGE TAPE
*---------------------------------------------------------------------*
*                                                                     *
*         CONSTANTS TO DEFINE COMPACTION TYPE                         *
*         (THE MEANING OF THE COMPACTION FIELD HAS CHANGED            *
*          FROM TYPE OF COMPACTION TO COMPACTION YES/NO.              *
*          TDSIDRC AND TDSCOMPT CAN BE USED INTERCHANGEABLY.)         *
*---------------------------------------------------------------------*
TDSCMPNS EQU   0              COMPACTION TYPE UNKNOWN OR NOT SET
TDSNOCMP EQU   1              NO COMPACTION
TDSIDRC  EQU   2              COMPACTION
TDSCOMPT EQU   2              COMPACTION
*---------------------------------------------------------------------*
*         CONSTANTS TO DEFINE SPECIAL ATTRIBUTE                       *
*---------------------------------------------------------------------*
TDSNOSPC EQU  0               VOLUME HAS NO SPECIAL ATTRIBUTE
TDSRDCOM EQU  1               VOLUME WILL BE MOUNTED FOR READ
*                             ONLY - ALL READ-COMPATIBLE
*                             DEVICES MAY BE SELECTED
*---------------------------------------------------------------------*
```

Figure 16. The Tape Device Selection Information Assembler Mapping—CBRTDSI

Chapter 7. Installation Exits

The following material provides information for creating your own installation exit routines. For examples of SAMPLIB jobs pertaining to these installation exits, refer to "Appendix A. SAMPLIB Members" on page 185.

Change Use Attribute Installation Exit (CBRUXCUA)

When the CBRXLCS macro is issued to change the use attribute of a volume, or when you use the ISMF ALTER line operator from the mountable tape volume list to change the use attribute of a volume, the change use attribute installation exit (CBRUXCUA) is called before the volume record is changed.

This installation exit is designed to allow the installation the opportunity to approve or disapprove the proposed change to the volume's use attribute, and to view, and if necessary, change many fields in the TCDB volume record. Approval or disapproval is communicated by way of the return code which is passed back in register 15. Volume record fields are updated by changing the appropriate fields in the change use attribute installation exit parameter list (CBRUXCPL).

The change use attribute installation exit is supplied by DFSMSrmm. If your installation is not using DFSMSrmm, the supplied exit returns a return code of 16, indicating that the installation exit not be invoked again. For more information, refer to *OS/390 DFSMSrmm Guide and Reference*, *OS/390 DFSMSrmm Implementation and Customization Guide*, and *OS/390 DFSMSrmm Diagnosis Guide*.

If your installation is not using DFSMSrmm and your tape management vendor has not supplied an exit, OAM provides a sample change use attribute exit (CBRSPUXC) in SAMPLIB that can be customized to fit your needs. The discussion that follows will assist in determining whether the exit is needed on your system. For more information on this SAMPLIB member, see "SAMPLIB Member CBRSPUXC" on page 197.

If the caller of the CBRXLCS macro specified EXITINFO on the macro invocation, the 16 bytes of free-form information provided on the invocation are passed to the exit. If EXITINFO is not specified on the CBRXLCS invocation, the field in the exit parameter list contains binary zeros.

The following library-related information is passed to the exit but may not be updated by the installation:
- Library name
- Library device type
- Library logical type
- Library description
- Library console name (if specified) or blanks

If the volume is not library-resident, the exit parameter list indicates a library name of SHELF and all the other library fields in the exit parameter list are blank.

Both the current use attribute as it is recorded in the tape volume record and the new use attribute are passed to the exit as input variables.

On a change to SCRATCH, the fields that are passed to the exit represent the values in the tape volume record as it currently exists in the TCDB before any changes are made. If a volume is being changed from PRIVATE to SCRATCH, and

if the installation exit supplies new values for any of the following fields, they are ignored. The following default scratch values are set before committing the changes to the TCDB:

- Volume use attribute = **S**
- Storage group name = ***SCRTCH***
- Write protection status = **N**
- Checkpoint volume indicator = **N**
- Volume expiration date = blank
- Tape device selection values:
  - Recording technology is unchanged
  - Media type is unchanged
  - Compaction indicator is unchanged
  - Special attribute is set to none

On a change to PRIVATE, the fields that are passed to the exit represent the values in the volume record as updated with the parameters specified on the CBRXLCS macro invocation. The installation may override some of those parameters as described in the table below. If the installation makes no changes, the values are committed to the TCDB as presented in CBRUXCPL. If the exit changes some fields, they are processed as described below.

If a field is described as 'input only' in the table below, it may not be updated by the installation. If it is described as 'output', it may be updated by the installation. If it is further described as 'verified', the contents or format of the field is validated before updating the TCDB volume record with information from the installation.

If the installation exit returns with an invalid value in a record field, returns with an invalid return code, or abnormally terminates, the current request fails. In addition, change use attribute processing for subsequent private to scratch requests is disabled and the change use attribute exit is not called again until either OAM is stopped and started, or the LIBRARY RESET,CBRUXCUA operator command is issued.

Note: When an error occurs in the installation exit, private to scratch requests are disabled in order to prevent the inadvertent assignment of a private volume to scratch status. Processing continues for scratch to private, scratch to scratch, and private to private requests without invocation of the change use attribute installation exit.

Figure 17 on page 151 lists the fields from the TCDB tape volume record that are passed to the exit. The fields may or may not be updated by the installation, depending on the function being performed (for example, changed to SCRATCH or to PRIVATE).

VARIABLE	SCR->PRIV	PRIV->SCR
Volume serial number	Input only	Input only
Current use attribute	Input only	Input only
New use attribute	Input only	Input only
Storage group name	Output/Verified	Output(ignored)
Write protection status	Output/Verified	Output(ignored)
Checkpoint volume indicator	Output/Verified	Output(ignored)
Volume location code	Input only	Input only
Shelf location	Output	Output
Volume owner information	Output	Output
Volume record creation date	Input only	Input only
Last entry or eject date	Input only	Input only
Last mounted date	Output/Verified	Output/Verified
Last written date	Output/Verified	Output/Verified
Volume expiration date	Output/Verified	Output(ignored)
Tape device selection information	Input only	Input only
Installation exit information	Input only	Input only

Figure 17. Fields Passed To The Installation Exit—CBRUXCUA

If a field is described as *verified*, the following values are checked for validity upon return from the exit:

Storage group name
When a volume is changed from *scratch* to *private* or *private* to *private*, the storage group name supplied may be blanks. If a nonblank value is supplied, the name must be defined in the active SMS configuration as a tape storage group. In addition, if the volume is library-resident, the library must be defined to that storage group.

Write protection status
Y, **N** or blank can be specified.

Checkpoint volume indicator
Y, **N** or blank can be specified.

Last mounted date
The date specified must be in ISO format (YYYY-MM-DD) or blanks.

Last written date
The date specified must be in ISO format (YYYY-MM-DD) or blanks.

Volume expiration date
The date specified must be in ISO format (YYYY-MM-DD) or blanks.

Change Use Attribute Installation Exit Parameter List (CBRUXCPL)

The change use attribute installation exit (CBRUXCUA) is passed by way of register 1, the pointer to a parameter list mapped by CBRUXCPL. Figure 18 on page 152 provides the format of CBRUXCPL.

```
UXCPL           DSECT ,               CBRUXCUA PARAMETER LIST
                SPACE 1
***********************************************************************
*                                                                     *
*          CHANGE USE ATTRIBUTE INSTALLATION EXIT PARAMETERS          *
*                                                                     *
***********************************************************************
UXCPARM         DS    0D              CBRUXCUA PARAMETER SECTION
UXCLIB          DS    CL8             LIBRARY NAME
*                                       (INPUT VARIABLE)
UXCLDEV         DS    CL8             LIBRARY DEVICE TYPE
*                                       (INPUT VARIABLE)
UXCLCON         DS    CL8             LIBRARY CONSOLE NAME
*                                       (INPUT VARIABLE)
UXCLTYP         DS    CL1             LIBRARY LOGICAL TYPE
*                                       'R' FOR AUTOMATED LIBRARY
*                                       'M' FOR MANUAL LIBRARY
*                                       (INPUT VARIABLE)
                DS    CL7             RESERVED
UXCLDESC        DS    CL120           LIBRARY DESCRIPTION
*                                       (INPUT VARIABLE)
                DS    CL8             RESERVED
UXCVOLSR        DS    CL6             VOLUME SERIAL NUMBER
*                                       (INPUT VARIABLE)
                DS    CL1             RESERVED
UXCCUSEA        DS    CL1             VOLUME USE ATTRIBUTE AS CURRENTLY
*                                     DEFINED IN THE TAPE VOLUME RECORD
*                                       'P' FOR PRIVATE
*                                       'S' FOR SCRATCH
*                                       (INPUT VARIABLE)
UXCUSEA         DS    CL1             REQUESTED VOLUME USE ATTRIBUTE
*                                       SPECIFIED ON THE CBRXLCS MACRO
*                                       'P' FOR PRIVATE
*                                       'S' FOR SCRATCH
*                                       (INPUT VARIABLE)
UXCWPROT        DS    CL1             WRITE PROTECTION STATUS
*                                       'Y' FOR WRITE-PROTECTED
*                                       'N' FOR NOT WRITE-PROTECTED
*                                       (INPUT FOR CHANGE TO SCRATCH
*                                       OUTPUT FOR CHANGE TO PRIVATE)
UXCCHKPT        DS    CL1             CHECKPOINT VOLUME INDICATOR
*                                       'Y' FOR CHECKPOINT VOLUME
*                                       'N' FOR NOT CHECKPOINT VOLUME
*                                       (INPUT FOR CHANGE TO SCRATCH
*                                       OUTPUT FOR CHANGE TO PRIVATE)
UXCLOC          DS    CL1             VOLUME LOCATION CODE
*                                       'L' FOR LIBRARY-RESIDENT
*                                       'S' FOR SHELF-RESIDENT
*                                       (INPUT/OUTPUT VARIABLE)
UXCTDSI         DS    0F              TAPE DEVICE SELECTION INFORMATION
UXCREC          DS    XL1             RECORDING TECHNOLOGY
*                                       (INPUT VARIABLE)
```

Figure 18. Change Use Attribute Installation Exit Parameter List—CBRUXCPL (Part 1 of 4)

```
UXCMEDIA      DS    XL1               MEDIA TYPE
*                                      (INPUT VARIABLE)
UXCCOMP       DS    XL1               COMPACTION TYPE
*                                      (INPUT VARIABLE)
UXCSPEC       DS    XL1               SPECIAL ATTRIBUTE
*                                      (INPUT VARIABLE)
UXCGROUP      DS    CL8               STORAGE GROUP NAME
*                                      (INPUT FOR CHANGE TO SCRATCH
*                                      OUTPUT FOR CHANGE TO PRIVATE)
UXCSHLOC      DS    CL32              SHELF LOCATION
*                                      (INPUT/OUTPUT VARIABLE)
UXCOWNER      DS    CL64              VOLUME OWNER INFORMATION
*                                      (INPUT/OUTPUT VARIABLE)
              DS    CL8               RESERVED
UXCCREAT      DS    CL10              VOLUME RECORD CREATION DATE
*                                      (INPUT VARIABLE)
UXCENTEJ      DS    CL10              LAST ENTRY OR EJECTION DATE
*                                      (INPUT VARIABLE)
UXCMOUNT      DS    CL10              LAST MOUNTED DATE
*                                      (INPUT/OUTPUT VARIABLE)
UXCWRITE      DS    CL10              LAST WRITTEN DATE
*                                      (INPUT/OUTPUT VARIABLE)
UXCEXPIR      DS    CL10              VOLUME EXPIRATION DATE
*                                      (INPUT FOR CHANGE TO SCRATCH
*                                      OUTPUT FOR CHANGE TO PRIVATE)
              DS    CL10              RESERVED
              DS    CL4               RESERVED
UXCEXITI      DS    CL16              INFORMATION TO BE PASSED TO THE
*                                      INSTALLATION EXIT
              DS    0D                END OF UXCPL
UXCPLLEN      EQU   *-UXCPL
              SPACE 1
***********************************************************************
*       RETURN CODES                                                 *
***********************************************************************
UXCNOCHG      EQU   0                 CHANGE THE VOLUME USE ATTRIBUTE AS
*                                      REQUESTED USING PARAMETER VALUES
*                                      PASSED IN ON INPUT
UXCCHG        EQU   4                 CHANGE THE USE ATTRIBUTE AS
*                                      REQUESTED BUT NOTE THAT PARAMETER
*                                      VALUES HAVE BEEN RETURNED BY EXIT
UXCFAIL       EQU   8                 DO NOT CHANGE THE VOLUME USE
*                                      ATTRIBUTE
*             EQU   12                RESERVED
UXCDONT       EQU   16                DO NOT CALL THE VOLUME USE
*                                      ATTRIBUTE INSTALLATION EXIT
*                                      AGAIN, BUT CHANGE THE USE
*                                      ATTRIBUTE AS REQUESTED USING
*                                      PARAMETER VALUES PASSED IN
*                                      ON INPUT
              SPACE 1
```

Figure 18. Change Use Attribute Installation Exit Parameter List—CBRUXCPL (Part 2 of 4)

```
      ************************************************************************
      *                                                                    *
      *          LIBRARY LOGICAL TYPE CONSTANTS                            *
      *                                                                    *
      ************************************************************************
      UXCREAL       EQU  C'R'                AUTOMATED LIBRARY
      UXCMAN        EQU  C'M'                MANUAL LIBRARY
                    SPACE 1
      ************************************************************************
      *                                                                    *
      *          USE ATTRIBUTE CONSTANTS                                   *
      *                                                                    *
      ************************************************************************
      UXCPRIV       EQU  C'P'                PRIVATE USE ATTRIBUTE
      UXCSCRT       EQU  C'S'                SCRATCH USE ATTRIBUTE
                    SPACE 1
      ************************************************************************
      *                                                                    *
      *          TAPE DEVICE SELECTION INFORMATION CONSTANTS               *
      *                                                                    *
      ************************************************************************
      UXNOCAR       EQU  0                   ZERO IS AN ACCEPTABLE TDSI VALUE
      ************************************************************************
      *          CONSTANTS TO DEFINE RECORDING TECHNOLOGY                  *
      ************************************************************************
      UXCNOREC      EQU  0                   RECORDING TECHNOLOGY UNKNOWN OR
      *                                        UNSPECIFIED
      UXC18TRK      EQU  1                   READ/WRITE ON 18-TRACK DEVICE
      UXC36TRK      EQU  2                   READ/WRITE ON 36-TRACK DEVICE
      UXC128TRK     EQU  3                   READ/WRITE ON 128-TRACK DEVICE
      UXC256TRK     EQU  4                   READ/WRITE ON 256-TRACK DEVICE
      ************************************************************************
      *          CONSTANTS TO DEFINE MEDIA TYPE                            *
      ************************************************************************
      UXCNOMED      EQU  0                   MEDIA TYPE UNKNOWN OR UNSPECIFIED
      UXCMED1       EQU  1                   MEDIA1 - CARTRIDGE SYSTEM TAPE
      UXCMED2       EQU  2                   MEDIA2 - ENHANCED CAPACITY CARTRIDGE
      *                                        SYSTEM TAPE
      UXCMED3       EQU  3                   MEDIA3 - HIGH PERFORMANCE CARTRIDGE
      *                                        TAPE
      UXCMED4       EQU  4                   MEDIA4 - EXTENDED HIGH PERFORMANCE
      *                                        CARTRIDGE TAPE
      ************************************************************************
      *          CONSTANTS TO DEFINE COMPACTION TYPE (THE MEANING OF THE   *
      *          COMPACTION FIELD HAS CHANGED FROM TYPE OF COMPACTION      *
      *          TO COMPACTION YES/NO - UXCIDRC AND UXCCOMPT               *
      *          CAN BE USED INTERCHANGEABLY)                              *
      ************************************************************************
      UXCCMPNS      EQU  0                   COMPACTION UNKNOWN OR NOT SET
      UXCNOCMP      EQU  1                   NO COMPACTION
      UXCCOMPT      EQU  2                   COMPACTION
      UXCIDRC       EQU  2                   COMPACTION
```

Figure 18. Change Use Attribute Installation Exit Parameter List—CBRUXCPL (Part 3 of 4)

```
***********************************************************************
*        CONSTANTS TO DEFINE SPECIAL ATTRIBUTE                        *
***********************************************************************
UXCNOSPC    EQU  0                     VOLUME HAS NO SPECIAL ATTRIBUTE
UXCRDCOM    EQU  1                     VOLUME WILL BE MOUNTED FOR READ ONLY -
*                                        ALL READ-COMPATIBLE DEVICES MAY BE
*                                        SELECTED
***********************************************************************
*                                                                     *
*        MISCELLANEOUS CONSTANTS                                       *
*                                                                     *
***********************************************************************
UXCPLSP     EQU  230                   UXCPL SUBPOOL NUMBER
UXCYES      EQU  C'Y'                  YES
UXCNO       EQU  C'N'                  NO
UXCBLANK    EQU  C' '                  BLANK
            SPACE 2
            MEND
```

Figure 18. Change Use Attribute Installation Exit Parameter List—CBRUXCPL (Part 4 of 4)

Storage is obtained below the line, from subpool 230, user key, for the installation exit parameter list.

Change Use Attribute Installation Exit (CBRUXCUA) Return Codes

The following are the return codes that can be passed back from the CBRUXCUA exit:

Code   Meaning

0   Change the use attribute of the volume specified as requested. No changes have been made to the parameter list (CBRUXCPL). Use what existed at the time the installation exit was called.

4   Change the use attribute of the volume specified and note that one or more fields in the parameter list (CBRUXCPL) have changed.

8   Do not change the use attribute of the volume specified.

> **Note:** If the installation does not allow the use attribute of a volume to be changed from SCRATCH to PRIVATE, the job may fail for the volume required.

12   Reserved.

16   Do not call the change use attribute installation exit again. Change the use attribute of the volume as requested using the existing volume record information.

Note: If the installation has returned return code 16 indicating that the exit should not be called again, the exit can be reactivated either by stopping and restarting OAM or issuing the LIBRARY RESET,CBRUXCUA command. If the exit abnormally terminates, passes back an invalid return code, or passes back invalid data, PRIVATE to SCRATCH change use attribute processing is discontinued until one of the above actions has been taken. This is intended to protect user data from being inadvertently scratched.

Change Use Attribute Installation Exit (CBRUXCUA) Usage Requirements

The change use attribute installation exit must reside in load module CBRUXCUA. It is invoked by way of the MVS LINK macro and must reside in a library in the LNKLST concatenation. The installation exit can be executed above or below the 16-megabyte line. The installation exit must be coded and linkedited on the system as reentrant.

Under some circumstances, CBRUXCUA may be invoked in a key other than the job key. Therefore, all storage dynamically acquired by CBRUXCUA should be obtained from subpool 227, 228, 229, 230, 231, or 241, in order to ensure that it is accessible in the program status word (PSW) key.

The following characteristics describe the execution environment in which the change use attribute installation exit is invoked:
- Task mode
- Unlocked
- Noncross memory mode (HASN = PASN = SASN)
- The addressing mode specified when the exit was linkage edited
- Primary ASC mode (not AR mode)
- User key, supervisor state

Mapping macro CBRUXCPL must be included by the installation exit.

Cartridge Entry Installation Exit (CBRUXENT)

This installation exit is called to approve or disapprove entry of a cartridge into a library and to determine TCDB volume record contents for each volume entered into a library.

The cartridge entry installation exit is supplied by DFSMSrmm. If your installation is not using DFSMSrmm, the supplied exit returns a return code of 16, indicating that the installation exit not be invoked again. For more information, refer to *OS/390 DFSMSrmm Guide and Reference*, *OS/390 DFSMSrmm Implementation and Customization Guide*, and *OS/390 DFSMSrmm Diagnosis Guide*.

If your installation is not using DFSMSrmm and your tape management vendor has not supplied an exit, OAM provides a sample cartridge entry installation exit (CBRSPUXE) in SAMPLIB that can be customized to fit your needs. The discussion that follows will assist in determining whether the exit is needed on your system. For more information on this SAMPLIB member, see "SAMPLIB Member CBRSPUXE" on page 204.

The following library-related information is passed to the exit. None of the library-related information can be modified by the exit.
- Library name
- Library device type
- Library console name
- Library logical type
- Library description

Figure 19 on page 157 lists the fields from the TCDB volume record that are passed to the exit.

VARIABLE	INPUT/OUTPUT
Volume serial number	Input only
Volume attribute	Input only
Volume use attribute	Output/Verified
Storage group name	Output/Verified
Write protection status	Output/Verified
Checkpoint volume indicator	Output/Verified
Volume location code	Input only
Shelf location	Output
Volume owner information	Output
Volume record creation date	Input only
Last entry or eject date	Input only
Last mounted date	Output/Verified
Last written date	Output/Verified
Volume expiration date	Output/Verified
Tape device selection information	Output/Verified

Figure 19. Fields Passed to the Installation Exit—CBRUXENT

The fields that are not marked as input only may be modified by the exit. If it is described as *output*, it may be updated by the installation. If it is further described as *verified*, the contents or format of the field is validity checked before updating the TCDB volume record with information from the installation. Date fields are in ISO format (YYYY-MM-DD).

For a previously unknown volume (no volume record exists), the volume serial number, the default volume use attribute, and the default tape device selection information are passed to the exit. The default volume use attribute is set by the storage administrator using the ISMF library define panel. The default TDSI is derived from the default entry data class, which is also set by the storage administrator using the ISMF library define panel. The default TDSI information is set as follows:
1. The library vision system determines the media type when the cartridge is entered. OAM uses this information to set the TDSI media type.
2. If a default entry data class is supplied in the library definition, the TDSI recording technology is set from the data class.
3. For media type MEDIA1, OAM sets 36-track recording technology if the default volume use attribute is PRIVATE and no recording technology is specified.
4. For media type MEDIA2, OAM always sets 36-track recording technology, since this is the only valid combination.
5. For media types MEDIA3 and MEDIA4, OAM sets 128-track recording technology if the default volume use attribute is PRIVATE and no recording technology is specified.

The remaining volume-related values are set to blanks. A volume record creation date of blanks indicates that the TCDB volume record does not exist.

For a known volume, whatever information existed in the volume record at the time the cartridge was entered is passed to the exit.

The UXEVATTR field can be used to determine if the volume being entered is a physical (non-VTS) volume, a logical volume, or a logical volume being imported.

If the shelf location field for a logical volume being imported indicates STACKED=*volser* at the beginning of the field, this information is passed to the entry exit and is cleared upon successful entry of the volume. This should be the exported stacked volume that was recorded in the volume record in the TCDB when the logical volume was exported.

If the cartridge entry processing in the manual tape library dataserver, was initiated with the manual cartridge entry programming interface, the 16-byte pass through value specified with the EXITINFO keyword on the CBRXLCS FUNC(MCE) macro invocation in passed to the installation exit as an input-only value. For automated or manual cartridge entry initiated at the library manager console, UXEEXITI contains binary zeros.

Since cartridge entry processing in a manual tape library dataserver can be initiated by the MCE programming interface, or by a tape operator command at the library console, the tape device selection field UXEMEDIA may be modified by the installation exit. If a media type is not provided prior to the invocation of the exit, and the exit makes no changes, entry processing for this volume fails, but processing for other volumes continues. However, if the exit explicitly modifies the media type and specifies an invalid value, entry processing is discontinued for this and all subsequent volumes. For entry processing in an automated tape library dataserver, UXEMEDIA is an input only field (the media type returned by the vision system is used).

The following values are validity checked upon return from the exit:
- Volume use attribute

  S(scratch) or **P**(private) can be specified.
- Storage group name

  For a volume use attribute of scratch, the storage group name supplied by the exit is ignored. OAM sets the storage group name to *SCRTCH*.

  For a volume use attribute of private, the storage group name may be set to blanks. A nonblank storage group name is always validity checked, even if the installation exit has not changed the value. The storage group name must be defined in the active SMS configuration as a tape storage group, and the library into which the volume is entered must be one of those in which the storage group resides. If the storage group name does not pass validation, and it is not provided by the installation exit, the cartridge is ejected, but cartridge entry processing continues.
- Write protection status

  Y, **N** or blank can be specified.
- Checkpoint volume indicator

  Y, **N** or blank can be specified.
- Last mounted date

  The date specified must be in ISO format (YYYY-MM-DD) or blanks.
- Last written date

  The date specified must be in ISO format (YYYY-MM-DD) or blanks.
- Volume expiration date

  The date specified must be in ISO format (YYYY-MM-DD) or blanks.
- Tape device selection information:

– Tape recording technology may be specified as 18-track, 36-track, 128-track, or 256-track. If it is returned as unknown, and the media type is MEDIA2, 36-track is set.
– For automated cartridge entry, the media type returned by the hardware is always used.
– Compaction may be specified as unknown, none, or compacted.
– Special attribute may be specified as none or read-compatible.
– The following combinations are invalid:
  - 18-track recording technology and MEDIA2 media type
  - 18-track, or 36-track recording technology and MEDIA3 or MEDIA4 media type
  - 128-track or 256-track recording technology and MEDIA1 or MEDIA2 media type
  - Unknown recording technology and MEDIA1, MEDIA3 or MEDIA4 media type and private volume use attribute

Shelf location and owner information are not validity checked.

If the installation exit returns with an invalid value in a volume record field, returns with an invalid return code, or abnormally terminates, cartridge entry processing is discontinued until OAM has been stopped and restarted, or the LIBRARY RESET,CBRUXENT command has been issued to reenable the cartridge entry installation exit. This is intended to prevent the inadvertent assignment of a private volume to scratch status. For an automated tape library dataserver or for cartridge entry processing in a manual tape library dataserver initiated at the library manager console, the volume remains in the insert category.

Note: It is not possible to determine which system in an SMS complex will perform cartridge entry processing for any particular occurrence unless the LIBRARY DISABLE,CBRUXENT command has been issued to disable cartridge entry installation exit processing on a system. However, to prevent unpredictable results, the installation should provide the same cartridge entry installation exit for each system in the SMS complex. If the library is being partitioned, each system in the TCDBplex must also run with the same cartridge entry installation exit. The LIBRARY DISABLE,CBRUXENT command can be used to test a new version of the exit by forcing cartridge entry processing to occur on a particular system.

Cartridge Entry Installation Exit Parameter List (CBRUXEPL)

The cartridge entry installation exit (CBRUXENT) is passed by way of register 1, the pointer to a parameter list mapped by CBRUXEPL. Figure 20 on page 160 provides the format of CBRUXEPL.

```
          UXEPL   DSECT ,            CARTRIDGE PARAMETER LIST
          *       SPACE 1
          ***********************************************************************
          *                                                                     *
          *       CARTRIDGE ENTRY INSTALLATION EXIT PARAMETERS                   *
          *                                                                     *
          ***********************************************************************
          UXEPARM   DS   0D                CBRUXENT PARAMETER SECTION
          UXELIB    DS   CL8               LIBRARY NAME
          *                                  (INPUT VARIABLE)
          UXELDEV   DS   CL8               LIBRARY DEVICE TYPE
          *                                  (INPUT VARIABLE)
          UXELCON   DS   CL8               LIBRARY CONSOLE NAME
          *                                  (INPUT VARIABLE)
          UXELTYP   DS   CL1               LIBRARY LOGICAL TYPE
          *                                   'R' FOR AUTOMATED LIBRARY
          *                                   'M' FOR MANUAL LIBRARY
          *                                  (INPUT VARIABLE)
                    DS   CL7               RESERVED
          UXELDESC  DS   CL120             LIBRARY DESCRIPTION
          *                                  (INPUT VARIABLE)
                    DS   CL8               RESERVED
          UXEVOLSR  DS   CL6               VOLUME SERIAL NUMBER
          *                                  (INPUT VARIABLE)
          UXEVATTR  DS   XL1               VOLUME ATTRIBUTE
          *                                   0 PHYSICAL NON-VTS VOLUME
          *                                   1 LOGICAL VTS VOLUME
          *                                   2 IMPORTED VTS LOGICAL VOLUME
          *                                  (INPUT VARIABLE)
                    DS   CL1               RESERVED
          UXEUSEA   DS   CL1               VOLUME USE ATTRIBUTE
          *                                   'P' FOR PRIVATE
          *                                   'S' FOR SCRATCH
          *                                  (INPUT/OUTPUT VARIABLE)
          UXEWPROT  DS   CL1               WRITE PROTECTION STATUS
          *                                   'Y' FOR WRITE-PROTECTED
          *                                   'N' FOR NOT WRITE-PROTECTED
          *                                  (INPUT/OUTPUT VARIABLE)
          UXECHKPT  DS   CL1               CHECKPOINT VOLUME INDICATOR
          *                                   'Y' FOR CHECKPOINT VOLUME
          *                                   'N' FOR NOT CHECKPOINT VOLUME
          *                                  (INPUT/OUTPUT VARIABLE)
          UXELOC    DS   CL1               VOLUME LOCATION CODE
          *                                   'L' FOR LIBRARY-RESIDENT
          *                                   'S' FOR SHELF-RESIDENT
          *                                  (INPUT VARIABLE)
          UXETDSI   DS   0F                TAPE DEVICE SELECTION INFORMATION
          UXEREC    DS   XL1               TAPE RECORDING TECHNOLOGY
          *                                  (INPUT/OUTPUT VARIABLE)
          UXEMEDIA  DS   XL1               MEDIA TYPE
          *                                  (INPUT/OUTPUT VARIABLE FOR MTLDS)
          *                                  (INPUT VARIABLE FOR ATLDS)
          UXECOMP   DS   XL1               COMPACTION TYPE
          *                                  (INPUT/OUTPUT VARIABLE)
          UXESPEC   DS   XL1               SPECIAL ATTRIBUTE
          *                                  (INPUT/OUTPUT VARIABLE)
```

Figure 20. The Cartridge Entry Installation Exit Parameter List—CBRUXEPL (Part 1 of 4)

```
UXEGROUP     DS   CL8               STORAGE GROUP NAME
*                                    (INPUT/OUTPUT VARIABLE)
UXESHLOC     DS   CL32              SHELF LOCATION
*                                    (INPUT/OUTPUT VARIABLE)
UXEOWNER     DS   CL64              VOLUME OWNER INFORMATION
*                                    (INPUT/OUTPUT VARIABLE)
             DS   CL8               RESERVED
UXECREAT     DS   CL10              VOLUME RECORD CREATION DATE
*                                    (INPUT VARIABLE)
UXEENTEJ     DS   CL10              LAST ENTRY OR EJECTION DATE
*                                    (INPUT VARIABLE)
UXEMOUNT     DS   CL10              LAST MOUNTED DATE
*                                    (INPUT/OUTPUT VARIABLE)
UXEWRITE     DS   CL10              LAST WRITTEN DATE
*                                    (INPUT/OUTPUT VARIABLE)
UXEEXPIR     DS   CL10              VOLUME EXPIRATION DATE
*                                    (INPUT/OUTPUT VARIABLE)
             DS   CL10              RESERVED
             DS   CL4               RESERVED
UXEEXITI     DS   CL16              INSTALLATION EXIT INFORMATION
*                                    (INPUT VARIABLE)
             DS   0D                END OF UXEPL
UXEPLLEN     EQU  *-UXEPL
             SPACE 1
***********************************************************************
*                                                                     *
*        RETURN CODES                                                 *
*                                                                     *
***********************************************************************
UXENOCHG     EQU  0                 PERFORM ENTER AS REQUESTED
*                                    USING PARAMETER VALUES
*                                    PASSED IN ON INPUT
UXECHG       EQU  4                 PERFORM ENTER REQUEST BUT NOTE
*                                    THAT PARAMETER VALUES HAVE
*                                    HAVE CHANGED ON EXIT
UXEFAIL      EQU  8                 DENY ENTER REQUEST (FOR AN ATLDS OR AN
*                                    ENTER REQUEST INTO AN MTLDS INITIATED
*                                    AT THE LIBRARY MANAGER CONSOLE, THE
*                                    VOLUME IS EJECTED FROM THE LIBRARY)
*                                    IS EJECTED FROM THE LIBRARY)
UXEIGNOR     EQU  12                IGNORE ENTER REQUEST (FOR AN ATLDS OR AN
*                                    ENTER REQUEST INTO AN MTLDS INITIATED
*                                    AT THE LIBRARY MANAGER CONSOLE, THE
*                                    VOLUME REMAINS IN THE LIBRARY IN
*                                    THE INSERT CATEGORY)
UXEDONT      EQU  16                DO NOT CALL THE CARTRIDGE ENTRY
*                                    INSTALLATION EXIT AGAIN AND
*                                    PERFORM CARTRIDGE ENTRY AS
*                                    REQUESTED USING THE PARAMETER
*                                    VALUES PASSED IN ON INPUT
             SPACE 1
```

Figure 20. The Cartridge Entry Installation Exit Parameter List—CBRUXEPL (Part 2 of 4)

```
    ***********************************************************************
    *                                                                     *
    *         LIBRARY LOGICAL TYPE CONSTANTS                              *
    *                                                                     *
    ***********************************************************************
    UXEAUTO     EQU  C'R'      AUTOMATED/REAL LIBRARY
    UXEMAN      EQU  C'M'      MANUAL LIBRARY
                SPACE 1
    ***********************************************************************
    *                                                                     *
    *     VOLUME ATTRIBUTE CONSTANTS                                      *
    *                                                                     *
    ***********************************************************************
    UXEPHYCL    EQU  0         PHYSICAL NON-VTS VOLUME
    UXELOGCL    EQU  1         LOGICAL VTS VOLUME
    UXEIMPRT    EQU  2         IMPORTED VTS LOGICAL VOLUME
                SPACE 1
    ***********************************************************************
    *                                                                     *
    *         USE ATTRIBUTE CONSTANTS                                     *
    *                                                                     *
    ***********************************************************************
    UXEPRIV     EQU  C'P'    PRIVATE USE ATTRIBUTE
    UXESCRT     EQU  C'S'    SCRATCH USE ATTRIBUTE
                SPACE 1
    ***********************************************************************
    *                                                                     *
    *     TAPE DEVICE SELECTION INFORMATION (TDSI) CONSTANTS             *
    *                                                                     *
    ***********************************************************************
    UXENOCAR    EQU  0         ZERO IS AN ACCEPTABLE VALUE FOR TDSI*
    ***********************************************************************
    *         CONSTANTS TO DEFINE TAPE RECORDING TECHNOLOGY              *
    ***********************************************************************
    UXENOREC    EQU  0         RECORDING TECHNOLOGY UNKNOWN
    *                              OR UNSPECIFIED
    UXE18TRK    EQU  1         READ/WRITE ON AN 18 TRACK DEVICE
    UXE36TRK    EQU  2         READ/WRITE ON A  36 TRACK DEVICE
    UXE128TRK   EQU  3         READ/WRITE ON A 128 TRACK DEVICE
    UXE256TRK   EQU  4         READ/WRITE ON A 256 TRACK DEVICE
    ***********************************************************************
    *         CONSTANTS TO DEFINE MEDIA TYPE                             *
    ***********************************************************************
    UXENOMED    EQU  0         MEDIA TYPE UNKNOWN OR UNSPECIFIED
    UXEMED1     EQU  1         MEDIA1 - CARTRIDGE SYSTEM TAPE
    UXEMED2     EQU  2         MEDIA2 - ENHANCED CAPACITY CARTRIDGE
    *                              SYSTEM TAPE
    UXEMED3     EQU  3         MEDIA3 - HIGH PERFORMANCE
    *                              CARTRIDGE TAPE
    UXEMED4     EQU  4         MEDIA4 - EXTENDED HIGH PERFORMANCE
    *                              CARTRIDGE TAPE
```

Figure 20. The Cartridge Entry Installation Exit Parameter List—CBRUXEPL (Part 3 of 4)

```
***********************************************************************
*         CONSTANTS TO DEFINE COMPACTION                              *
*  (THE MEANING OF THE COMPACTION FIELD HAS CHANGED FROM TYPE OF      *
*    COMPACTION TO COMPACTION YES/NO - UXEIDRC AND UXECOMPT CAN BE    *
*    USED INTERCHANGEABLY                                             *
***********************************************************************
UXECMPNS    EQU  0         COMPACTION UNKNOWN OR NOT SET
UXENOCMP    EQU  1         NO COMPACTION
UXEIDRC     EQU  2         COMPACTION
UXECOMPT    EQU  2         COMPACTION
***********************************************************************
*        CONSTANTS TO DEFINE SPECIAL ATTRIBUTE                        *
***********************************************************************
UXENOSPC    EQU  0         VOLUME HAS NO SPECIAL ATTRIBUTE
UXERDCOM    EQU  1         VOLUME WILL BE MOUNTED FOR READ ONLY -
*                            ALL READ-COMPATIBLE DEVICES MAY BE
*                            SELECTED
            SPACE 1
***********************************************************************
*                                                                    *
*        MISCELLANEOUS CONSTANTS                                      *
*                                                                    *
***********************************************************************
UXEPLSP     EQU  0         UXEPL SUBPOOL NUMBER
UXEYES      EQU  C'Y'      YES
UXENO       EQU  C'N'      NO
UXEBLANK    EQU  C' '      BLANK
            SPACE 2
            MEND  ,
```

Figure 20. The Cartridge Entry Installation Exit Parameter List—CBRUXEPL (Part 4 of 4)

OAM obtains storage below the line, from subpool 0, key 5, for the installation exit parameter list.

Cartridge Entry Installation Exit (CBRUXENT) Return Codes

The following are the return codes that can be passed back from the exit:

Code   Meaning

0   Perform cartridge entry as requested. No changes have been made to the parameter list (CBRUXEPL). Use what existed at the time the installation exit was called.

4   Perform cartridge entry and note that one or more fields in the parameter list (CBRUXEPL) have changed.

8   Do not allow this cartridge to be entered. For an automated tape library dataserver or for an enter request into a manual tape library dataserver initiated at the library manager console, OAM schedules the cartridge to be ejected.

12   Ignore the cartridge entry request. For an automated tape library dataserver or for an enter request into a manual tape library dataserver initiated at the library manager console, OAM leaves the cartridge in the library (volume left in the insert category).

16   Do not call the cartridge entry installation exit again. Perform cartridge entry as requested using the attributes that existed at the time the exit was originally called.

If an invalid return code is passed back, OAM discontinues cartridge entry processing.

Note: Once OAM is told not to invoke the installation exit again (return code 16) or cartridge entry processing is discontinued, the only way to reactivate the exit is to stop and restart OAM, or to issue the LIBRARY RESET,CBRUXENT command.

Cartridge Entry Installation Exit (CBRUXENT) Usage Requirements

The cartridge entry installation exit must reside in load module CBRUXENT. It is invoked by OAM by way of the MVS LINK macro and must reside in a library in the LNKLST concatenation. The installation exit can be executed above or below the 16-megabyte line. If multiple tape libraries are defined to the system, the installation exit must be coded and linkedited on the system as reentrant.

The following characteristics describe the execution environment in which the cartridge entry installation exit is invoked:
- Task mode
- Unlocked
- Noncross memory mode (HASN = PASN = SASN)
- The addressing mode specified when the exit was linkage edited
- Primary ASC mode (not AR mode)
- Key 5, problem state; or a user key, supervisor state

Mapping macro CBRUXEPL must be included by the installation exit.

Cartridge Eject Installation Exit (CBRUXEJC)

This installation exit is called to approve or disapprove a request to eject a volume from a tape library, as a notification call when a logical volume has been exported, and to determine the TCDB volume record disposition and contents for each volume.

The cartridge eject installation exit is supplied by DFSMSrmm. If your installation is not using DFSMSrmm, the supplied exit returns a return code of 16, indicating that the installation exit not be invoked again. For more information, refer to *OS/390 DFSMSrmm Guide and Reference*, *OS/390 DFSMSrmm Implementation and Customization Guide*, and *OS/390 DFSMSrmm Diagnosis Guide*.

If your installation is not using DFSMSrmm and your tape management vendor has not supplied an exit, OAM provides a sample cartridge eject installation exit (CBRSPUXJ) in SAMPLIB that can be customized to fit your needs. The discussion that follows will assist in determining whether the exit is needed on your system. For more information on this SAMPLIB member, see "SAMPLIB Member CBRSPUXJ" on page 211.

The following library-related information is passed to the exit. None of the library-related information may be modified by the installation exit.
- Library name
- Library device type
- Library console name, or blanks
- Library logical type
- Library description

The exit is also informed of the disposition of the volume record (KEEP or PURGE).

Figure 21 lists the fields from the TCDB volume record that are passed to the exit.

VARIABLE	INPUT/OUTPUT
Notification call indicator	Input only
Stacked container	Input only/with export call
Volume serial number	Input only
Storage group name	Output/Verified
Volume use attribute	Output/Verified
Write protection status	Output/Verified
Checkpoint volume indicator	Output/Verified
Volume location code	Input only
Shelf location	Output
Volume owner information	Output
Volume record creation date	Input only
Last entry or eject date	Input only
Last mounted date	Output/Verified
Last written date	Output/Verified
Volume expiration date	Output/Verified
Tape device selection information	Input only

Figure 21. Fields Passed to the Installation Exit—CBRUXEJC

The fields that are not marked as input only may be modified by the exit. If it is described as *output*, it may be updated by the installation. If it is further described as *verified*, the contents or format of the field is validity checked before updating the TCDB volume record with information from the installation. Date fields are in ISO format (YYYY-MM-DD).

The 16-byte pass-through value specified with the EXITINFO keyword on the CBRXLCS FUNC(EJECT) macro invocation is passed to the installation exit as an input-only value. If the eject request has come from any source except CBRXLCS, the field contains binary zeros.

If a volume record disposition of purge (**P**) is returned by the installation exit, the only value retained from the parameter list is the shelf location. This enables the proper shelf location to be displayed upon eject completion.

If a volume record disposition of keep (**K**) is returned by the installation exit, the following values are validity checked:
- Volume use attribute

  S (scratch) or **P** (private) can be specified.
- Storage group name

  For a volume use attribute of scratch, OAM sets the storage group name to *SCRTCH*. Any name supplied by the exit is ignored. For a volume use attribute of private, the storage group name may be set to blanks. If a nonblank value is provided, the storage group must be part of the active configuration, and it must be a tape storage group.
- Write protection status

Y, **N** or blank can be specified.

- Checkpoint volume indicator

  Y, **N** or blank can be specified.

- Last mounted date

  The date specified must be in ISO format (YYYY-MM-DD) or blanks.

- Last written date

  The date specified must be in ISO format (YYYY-MM-DD) or blanks.

- Volume expiration date

  The date specified must be in ISO format (YYYY-MM-DD) or blanks.

Shelf location and owner information are not validity checked.

If the installation exit returns with an invalid value in a volume record field, returns with an invalid return code, or abnormally terminates, cartridge eject processing is discontinued until OAM has been stopped and restarted, or the LIBRARY RESET,CBRUXEJC command has been issued to reenable the cartridge eject installation exit.

Export Completion Processing

Unlike a physical volume, to remove a logical volume with data from a VTS, it cannot simply be ejected from the library.

To remove a logical volume with data from a library, the volume must be physically exported from the library. For more information on the export process, see "Exporting Logical Volumes from a VTS Subsystem" on page 27.

When a logical volume is successfully exported from the library, the cartridge eject installation exit is notified and a notification call indicator (UXJEXPRT) is set in field UXJNCALL. The volume serial number of the stacked container volume on which the logical volume resides can be found in the stacked volume container field, UXJSTKVS. The installation or its tape management system then stores the container information for later use when the logical volume is imported back into a library. If the TCDB is shared across multiple systems but each system has its own tape management system database, the exit can return with RC=12 (IGNORE) if the exported volume is not known to this tape management system. This leaves the volume in the exported category to be processed by a system that "owns" that volume. If appropriate for the installation, the 32-character free form shelf location field in the TCDB volume record (located in the UXJSHLOC field of the cartridge eject installation exit parameter list), can also be used to store the container volume serial number. This would require that the volume record be kept after a logical volume is exported from the library.

If the volume record disposition returned from the exit indicates that the volume record should be kept and the shelf location returned from the exit is blank, LCS automatically stores the container volume serial number in the shelf location field of the volume record as STACKED=*volser*. This information can later be used in the volume not in library installation exit (CBRUXVNL) to assist the installation and operator in importing a logical volume. LCS also stores this information if the exit is not to be invoked, the volume record disposition is KEEP, and the shelf location is blank.

This call to the installation exit is a notification call only since the export operation for the logical volume is near completion. This means that the logical volume has

already been written to a stacked volume, which will soon be ready for removal. All cartridge eject parameter list fields that can be updated today when a physical volume is ejected from a library can be updated when a logical volume is exported from a library and are subject to the same validity checks.

Cartridge Eject Installation Exit Parameter List (CBRUXJPL)

The cartridge eject installation exit (CBRUXEJC) is passed by way of register 1, the pointer to a parameter list mapped by CBRUXJPL. Figure 22 on page 168 provides the format of CBRUXJPL.

```
              UXJPL           DSECT ,            CBRUXEJC PARAMETER LIST
                              SPACE 1
              ***********************************************************************
              *                                                                    *
              *        CARTRIDGE EJECT INSTALLATION EXIT PARAMETERS                 *
              *                                                                    *
              ***********************************************************************
              UXJPARM         DS    0D           CBRUXEJC PARAMETER SECTION
              UXJLIB          DS    CL8          LIBRARY NAME
              *                                    (INPUT VARIABLE)
              UXJLDEV         DS    CL8          LIBRARY DEVICE TYPE
              *                                    (INPUT VARIABLE)
              UXJLCON         DS    CL8          LIBRARY CONSOLE NAME
              *                                    (INPUT VARIABLE)
              UXJLTYP         DS    CL1          LIBRARY LOGICAL TYPE
              *                                    'R' FOR AUTOMATED LIBRARY
              *                                    'M' FOR MANUAL LIBRARY
              *                                    (INPUT VARIABLE)
                              DS    CL7          RESERVED
              UXJLDESC        DS    CL120        LIBRARY DESCRIPTION
              *                                    (INPUT VARIABLE)
                              DS    CL8          RESERVED
              UXJVDISP        DS    CL1          VOLUME RECORD DISPOSITION
              *                                    'K' KEEP VOLUME RECORD IN
              *                                    THE TAPE CONFIGURATION
              *                                    DATA BASE
              *                                    'P' PURGE VOLUME RECORD FROM
              *                                    THE TAPE CONFIGURATION
              *                                    DATA BASE
              *                                    (INPUT/OUTPUT VARIABLE)
              UXJNCALL        DS    XL1          NOTIFICATION CALL INDICATOR
              *                                    0 EJECT REQUEST FOR PHYSICAL
              *                                       VOLUME
              *                                    1 LOGICAL VOLUME SUCCESSFULLY
              *                                       EXPORTED
              *                                    (INPUT VARIABLE)
              UXJSTKVS        DS    CL6          STACKED CONTAINER
              *                                    VOLUME ON WHICH EXPORTED
              *                                    LOGICAL VOLUME RESIDES
              *                                    (INPUT VARIABLE W/EXPORT CALL)
              UXJVOLSR        DS    CL6          VOLUME SERIAL NUMBER
              *                                    (INPUT VARIABLE)
                              DS    CL2          RESERVED
              UXJUSEA         DS    CL1          VOLUME USE ATTRIBUTE
              *                                    'P' FOR PRIVATE
              *                                    'S' FOR SCRATCH
              *                                    (INPUT/OUTPUT VARIABLE)
              UXJWPROT        DS    CL1          WRITE PROTECTION STATUS
              *                                    'Y' FOR WRITE-PROTECTED
              *                                    'N' FOR NOT WRITE-PROTECTED
              *                                    (INPUT/OUTPUT VARIABLE)
              UXJCHKPT        DS    CL1          CHECKPOINT VOLUME INDICATOR
              *                                    'Y' FOR CHECKPOINT VOLUME
              *                                    'N' FOR NOT CHECKPOINT VOLUME
              *                                    (INPUT/OUTPUT VARIABLE)
```

Figure 22. The Cartridge Eject Installation Exit Parameter List—CBRUXJPL (Part 1 of 4)

```
UXJLOC      DS   CL1             VOLUME LOCATION CODE
*                                  'L' FOR LIBRARY-RESIDENT
*                                  'S' FOR SHELF-RESIDENT
*                                  (INPUT VARIABLE)
UXJTDSI     DS   0F              TAPE DEVICE SELECTION INFO
UXJREC      DS   XL1             TAPE RECORDING TECHNOLOGY
*                                  (INPUT VARIABLE)
UXJMEDIA    DS   XL1             MEDIA TYPE
*                                  (INPUT VARIABLE)
UXJCOMP     DS   XL1             COMPACTION TYPE
*                                  (INPUT VARIABLE)
UXJSPEC     DS   XL1             SPECIAL ATTRIBUTE
*                                  (INPUT VARIABLE)
UXJGROUP    DS   CL8             STORAGE GROUP NAME
*                                  (INPUT/OUTPUT VARIABLE)
UXJSHLOC    DS   CL32            SHELF LOCATION
*                                  (INPUT/OUTPUT VARIABLE)
UXJOWNER    DS   CL64            VOLUME OWNER INFORMATION
*                                  (INPUT/OUTPUT VARIABLE)
            DS   CL8              RESERVED
UXJCREAT    DS   CL10            VOLUME RECORD CREATION DATE
*                                  (INPUT VARIABLE)
UXJENTEJ    DS   CL10            LAST ENTRY OR EJECTION DATE
*                                  (INPUT VARIABLE)
UXJMOUNT    DS   CL10            LAST MOUNTED DATE
*                                  (INPUT/OUTPUT VARIABLE)
UXJWRITE    DS   CL10            LAST WRITTEN DATE
*                                  (INPUT/OUTPUT VARIABLE)
UXJEXPIR    DS   CL10            VOLUME EXPIRATION DATE
*                                  (INPUT/OUTPUT VARIABLE)
            DS   CL10            RESERVED
            DS   CL4             RESERVED
UXJEXITI    DS   CL16            INSTALLATION EXIT INFORMATION
*                                  (INPUT VARIABLE)
            DS   0D              END OF UXJPL
UXJPLLEN    EQU  *-UXJPL
            SPACE 1
***********************************************************************
*                                                                     *
*          RETURN CODES                                               *
*                                                                     *
***********************************************************************
UXJNOCHG    EQU  0               PERFORM EJECT/EXPORT AS NOTIFIED
*                                  USING PARAMETER VALUES
*                                  PASSED IN ON INPUT
UXJCHG      EQU  4               PERFORM EJECT/EXPORT AS NOTIFIED
*                                  BUT NOTE THAT PARAMETER VALUES
*                                  HAVE CHANGED ON EXIT
UXJFAIL     EQU  8               PHYSICAL VOLUME NOT TO BE EJECTED
UXJIGNOR    EQU  12              IGNORE EXPORT COMPLETION PROCESSING
                                 FOR THIS LOGICAL VOLUME (VOLUME
                                 REMAINS IN EXPORTED CATEGORY)
UXJDONT     EQU  16              DO NOT CALL THE CARTRIDGE
*                                  EJECT INSTALLATION EXIT AGAIN
*                                  AND PERFORM CARTRIDGE
*                                  EJECT/EXPORT AS NOTIFIED
*                                  USING THE PARAMETER VALUES
*                                  PASSED IN ON INPUT
```

Figure 22. The Cartridge Eject Installation Exit Parameter List—CBRUXJPL (Part 2 of 4)

```
          SPACE 1
**********************************************************************
*                                                                    *
*        LIBRARY LOGICAL TYPE CONSTANTS                              *
*                                                                    *
**********************************************************************
UXJAUTO     EQU  C'R'             AUTOMATED/REAL LIBRARY
UXJMAN      EQU  C'M'             MANUAL LIBRARY
          SPACE 1
**********************************************************************
*                                                                    *
*        VOLUME RECORD DISPOSITION (EJECT TYPE) CONSTANTS            *
*                                                                    *
**********************************************************************
UXJKEEP     EQU  C'K'             KEEP VOLUME RECORD
UXJPURGE    EQU  C'P'             PURGE VOLUME RECORD
          SPACE 1
**********************************************************************
*                                                                    *
*        NOTIFICATION CALL INDICATOR CONSTANTS                       *
**********************************************************************
UXJEJECT    EQU  0               EJECT REQUEST FOR PHYSICAL
*                                  VOLUME
UXJEXPRT    EQU  1               LOGICAL VOLUME SUCCESSFULLY
*                                  EXPORTED
          SPACE 1
**********************************************************************
*                                                                    *
*        USE ATTRIBUTE CONSTANTS                                     *
*                                                                    *
**********************************************************************
UXJPRIV     EQU  C'P'             PRIVATE USE ATTRIBUTE
UXJSCRT     EQU  C'S'             SCRATCH USE ATTRIBUTE
          SPACE 1
**********************************************************************
*                                                                    *
*        TAPE DEVICE SELECTION INFORMATION (TDSI) CONSTANTS          *
*                                                                    *
**********************************************************************
UXJNOCAR    EQU  0               ZERO IS AN ACCEPTABLE VALUE
*                                  FOR TDSI
**********************************************************************
*        CONSTANTS TO DEFINE TAPE RECORDING TECHNOLOGY              *
**********************************************************************
UXJNOREC    EQU  0               RECORDING TECHNOLOGY UNKNOWN
*                                  OR UNSPECIFIED
UXJ18TRK    EQU  1               READ/WRITE ON AN 18 TRACK
*                                  DEVICE
UXJ36TRK    EQU  2               READ/WRITE ON A 36 TRACK
*                                  DEVICE
UXJ128TRK   EQU  3               READ/WRITE ON A 128 TRACK
*                                  DEVICE
UXJ256TRK   EQU  4               READ/WRITE ON A 256 TRACK
*                                  DEVICE
```

Figure 22. The Cartridge Eject Installation Exit Parameter List—CBRUXJPL (Part 3 of 4)

```
***********************************************************************
*         CONSTANTS TO DEFINE MEDIA TYPE                             *
***********************************************************************
UXJNOMED    EQU  0                   MEDIA TYPE UNKNOWN OR
*                                      UNSPECIFIED
UXJMED1     EQU  1                   MEDIA1 - CARTRIDGE SYSTEM TAPE
UXJMED2     EQU  2                   MEDIA2 - ENHANCED CAPACITY
*                                      CARTRIDGE SYSTEM TAPE
UXJMED3     EQU  3                   MEDIA3 - HIGH PERFORMANCE
*                                      CARTRIDGE TAPE
UXJMED4     EQU  4                   MEDIA4 - EXTENDED HIGH PERFORMANCE
*                                      CARTRIDGE TAPE
***********************************************************************
*         CONSTANTS TO DEFINE COMPACTION (THE MEANING OF THE         *
*         COMPACTION FIELD HAS CHANGED FROM TYPE OF COMPACTION       *
*         TO COMPACTION YES/NO - UXJIDRC AND UXJCOMPT                *
*         CAN BE USED INTERCHANGEABLY)                               *
***********************************************************************
UXJCMPNS    EQU  0                   COMPACTION UNKNOWN OR NOT SET
UXJNOCMP    EQU  1                   NO COMPACTION
UXJCOMPT    EQU  2                   COMPACTION
UXJIDRC     EQU  2                   COMPACTION
***********************************************************************
*         CONSTANTS TO DEFINE SPECIAL ATTRIBUTE                      *
***********************************************************************
UXJNOSPC    EQU  0                   VOLUME HAS NO SPECIAL
*                                        ATTRIBUTE
UXJRDCOM    EQU  1                   VOLUME WILL BE MOUNTED FOR READ
*                                        ONLY - ALL READ-COMPATIBLE
*                                        DEVICES MAY BE SELECTED
            SPACE 1
***********************************************************************
*                                                                   *
*         MISCELLANEOUS CONSTANTS                                    *
*                                                                   *
***********************************************************************
UXJPLSP     EQU   0                  UXJPL SUBPOOL NUMBER
UXJYES      EQU   C'Y'               YES
UXJNO       EQU   C'N'               NO
UXJBLANK    EQU   C' '               BLANK
            SPACE 2
            MEND  ,
```

Figure 22. The Cartridge Eject Installation Exit Parameter List—CBRUXJPL (Part 4 of 4)

OAM obtains storage below the line, from subpool 0, key 5, for the installation exit
parameter list.

Cartridge Eject Installation Exit (CBRUXEJC) Return Codes

The following are the return codes that can be passed back to OAM:

Code   Meaning

0   Perform cartridge ejection as requested. No changes have been made to
          the parameter list (CBRUXJPL). Use the attributes that existed at the time
          the installation exit was originally called.

4   Perform cartridge ejection and note that one or more fields in the parameter
          list (CBRUXJPL) have changed.

8   Do not allow this cartridge to be ejected.

12   Ignore export completion processing for this logical volume. OAM leaves
          the volume in the library in the exported category.

16   Do not call the cartridge eject installation exit again and perform cartridge ejection as requested using the attributes that existed at the time the installation exit was originally called.

Note: If an invalid return code is passed back, OAM discontinues cartridge eject processing.

Cartridge Eject Installation Exit (CBRUXEJC) Usage Requirements

The cartridge eject installation exit must reside in load module CBRUXEJC. It is invoked by OAM through the MVS LINK macro and must reside in a library in the LNKLST concatenation. The installation exit can be executed above or below the 16-megabyte line. If multiple tape libraries are defined to the system, the installation exit must be coded and linkedited on the system as reentrant.

Note: Once OAM is told not to invoke the installation exit again (return code 16) or cartridge ejection processing is discontinued, the only way to reactivate the exit is to stop and restart OAM, or issue the LIBRARY RESET,CBRUXEJC command.

The following characteristics describe the execution environment in which the cartridge eject installation exit is invoked:
- Task mode
- Unlocked
- Noncross memory mode (HASN = PASN = SASN)
- The addressing mode specified when the exit was linkage edited
- Primary ASC mode (not AR mode)
- Key 5, problem state

Mapping macro CBRUXJPL must be included by the installation exit.

Volume Not in Library Installation Exit (CBRUXVNL)

The volume not in library installation exit (CBRUXVNL) receives control under a variety of circumstances and error conditions. The primary purpose of the exit is to give the installation the opportunity to enter a volume into a tape library dataserver during job step setup, device allocation, and library mount processing.

The volume not in library installation exit is supplied by DFSMSrmm. If your installation is not using DFSMSrmm, the supplied exit returns a return code of 16, indicating that the installation exit not be invoked again. For more information, refer to *OS/390 DFSMSrmm Guide and Reference*, *OS/390 DFSMSrmm Implementation and Customization Guide*, and *OS/390 DFSMSrmm Diagnosis Guide*.

If your installation is not using DFSMSrmm and your tape management vendor has not supplied an exit, OAM provides a sample volume not in library installation exit (CBRSPUXV) in SAMPLIB that can be customized to fit your needs. The discussion that follows will assist in determining whether the exit is needed on your system. For more information on this SAMPLIB member, see "SAMPLIB Member CBRSPUXV" on page 219.

Invoking the Installation Exit

This installation exit can be invoked during the following processing steps:
- Job step setup
- Device allocation

- Library mount

The following conditions can cause invocation of the exit:
- If some of the tape volumes in a multivolume tape data set are not resident in a tape library, the request would fail, because all the tape volumes belonging to the same multivolume data set must reside in the same tape library dataserver. The exit can be used to direct the missing tape volumes back into the library.

  Note: In a multivolume data set request, during job step setup and device allocation processing, the exit is only invoked when the first volume of the data set does not reside in a tape library. However, later during library mount processing, the exit is invoked each time a multivolume data set volume is needed but does not reside in the tape library. The exit can wait until library mount processing to get the additional volumes entered on an "as needed" basis, or if it is known that specific applications always use the entire multivolume data set, the exit, during job step setup, can instruct the operator to enter all volumes of the multivolume data set. The choice is determined by the exit. However, keep in mind that the exit is only passed one volume serial number at a time, and is not passed all the volumes in the multivolume data set, nor is it passed any data set information.

- If none of the tape volumes reside in a tape library, or the tape volumes were previously resident in a tape library dataserver but are currently shelf-resident, they are considered non-SMS managed tape volumes and are allocated to a tape drive of the appropriate device type outside a tape library. The exit can be used to enter the tape volumes into a tape library.

  For example, if the only 3490E tape drives that an installation has are inside a tape library, then whenever a shelf-resident enhanced capacity cartridge system tape is requested, it must be entered into a tape library containing a 3490E tape drive. The exit can be used to direct the enhanced capacity cartridge system tape into a library that is capable of handling the request.

  Note: Prior to invoking the exit during job step setup, OAM does not know if there are any stand-alone drives capable of handling the volume. The exit is simply invoked to report that the tape volume is not in a tape library dataserver, and it allows the exit to decide whether the volume should reside in a tape library dataserver, and if so, which tape library dataserver should be used.

- If a tape volume is ejected from a tape library dataserver between job step setup and library mount processing, the request requiring the tape volume would fail. The exit can reenter the required tape volume into the specified tape library to prevent the job from failing.

  However, if a logical volume is being exported from a tape library dataserver between job setup and library mount processing, the mount request immediately fails, since an export operation is not immediate.

  Note: The input to the exit at device allocation does not identify the library to which the tape volume must return, because the information was erased when the volume was ejected from the library. Therefore, the exit must rely upon other sources to determine which library should receive the missing volume.

- If tape volumes are not library-resident in a tape library dataserver and are physically located in a remote area, requests for these volumes are allocated to stand-alone tape drives and are delayed until the volumes are retrieved and

mounted on the stand-alone tape drives. While jobs are waiting for these tape volumes to be mounted, the system resources allocated to these tape volumes are unavailable for use by other jobs. CBRUXVNL can identify this condition and interact with the installation's tape management system to determine the best course of action to alleviate this waste of time and resource.

- Since the ATLDS has a *finite* tape cartridge capacity, infrequently used tape volumes may be ejected until their next scheduled use. These tape cartridges should be reentered in advance of reuse to avoid job processing delays, but since this is not always possible, this exit can be used to identify and correct this condition, preventing job failures.

  Note: With JES3, the job step notification occurs prior to the job being scheduled for execution. Therefore, missing tapes can be located and entered into the tape library dataserver well in advance of usage.

Processing Options for the Installation Exit

The following options are available to the exit:
- Continue without entering the cartridge into a library.
- Locate the requested volume and enter it into a tape library dataserver.
- Cancel the request immediately.
- Indicate that the exit not be invoked again.

Logical Volume Considerations

If a logical volume is requested to be mounted, it is important that the installation exit also display the exported stacked volume that contains the logical volume. If the OAM supplied default is being used, this information is automatically displayed if the shelf location in the TCDB volume record is STACKED=*volser*.

Entering Tape Volumes in the Library Using the Installation Exit

To enter tape volumes into the library under the direction of the exit, the following conditions must both be met:

- OAM must be up and running on at least one of the systems sharing the tape library dataserver in the SMS complex or TCDBplex.
- OAM must have been started since the most recent IPL on the system running the requested job.

When entering a volume into a tape library dataserver under the direction of CBRUXVNL, you must set the volume use attribute to "PRIVATE"; otherwise, the request fails. This is because only specific volume requests are handled by the exit and a specific volume request for a scratch tape is not permitted. Volume use attributes are set by default from the ISMF Library Definition or by the cartridge entry installation exit.

Perform the following steps when you enter a volume into a tape library dataserver:
- Locate the requested volume using the tape management system inventory.
- Enter the volume into a tape library dataserver (or if indicated, the specific tape library dataserver). For a logical volume, enter the required exported stacked volume and initiate a single volume import at the library manager console.
- Reply to the outstanding WTOR at the MVS console.

  Note: If the exit is waiting for an extended period for human intervention to finish processing, this causes delays for other jobs that may be processing at the same time or that may need the same resources as the job for which the exit

is active. If the volume is not entered into the library within 15 minutes, CBR3646D is issued indicating that the operator should retry or cancel the job request.

Possible Error Conditions

The installation may introduce a number of error conditions in the process of re-entering a cartridge into a library under the control of the volume not in library installation exit. The following errors may cause immediate or eventual job failures:

- Entering a volume into the wrong library prompts the issuance of message CBR3646D
- Setting the wrong storage group name in the cartridge entry installation exit
- Setting incorrect tape device selection information in the cartridge entry installation exit
- Setting the scratch volume use attribute in the cartridge entry installation exit incorrectly
- Inadvertently requesting a volume with a level of TDSI information not recognized by the system

Note: If the operator enters the volume into the wrong library, or OAM is not aware of the entry of the volume within 15 minutes, OAM issues the CBR3646D message. This allows the operator the opportunity to correct the situation and retry or cancel the operation.

The best way to avoid these errors is to not eject the volumes in the first place. If this is not practical, then the tape volume record should be kept by using the KEEP option of the LIBRARY EJECT operator command or through the ISMF Mountable Tape Volume line operator when the volume is ejected. This preserves the information about the tape volume so that the Cartridge Entry Installation Exit does not have to rebuild the tape volume record.

If a job on a lower-level system inadvertently requests a volume whose media type or recording technology is not understood at this software level, the exit can cancel the job, returning a return code 8, or it can proceed with entering the volume. If the exit proceeds and enters the volume, once it is successfully entered on an up-level system and the exit returns with a return code 4 (indicating re-try), the job on the down-level system fails during job step setup on subsequent retrieval of the volume record. If the host detects that it is an up-level volume (if the TCDB volume record exists), the call to the exit is bypassed and the job is canceled.

Job Step Setup

CBRUXVNL is invoked during job step setup processing to provide an opportunity to enter the tape volume into any tape library dataserver chosen. The call to the exit is made when the first or only volume serial number specified on the DD statement or dynamic allocation request is not an online DASD volume and no record exists in the TCDB for the volume, or a record exists but indicates the volume is shelf-resident. Shelf-resident means the tape volume was ejected from the tape library dataserver with the KEEP option, which retained the TCDB record. For new data sets, this occurs just prior to calling the ACS routines; for old data sets, this occurs when the TCDB search completes prior to device allocation.

Figure 23 on page 176 lists the contents of the exit input when a volume record does not exist in the TCDB.

Variable	Meaning
UXNVOLSR	Volume serial number
UXNWHERE	1 indicates job step setup processing
UXNERROR	1 indicates no TCDB record

Figure 23. CBRUXVNL Input During Job Step Setup—No TCDB Volume Record

Figure 24 lists the contents of the exit input when a shelf-resident tape volume record exists in the TCDB.

Variable	Meaning
UXNVOLSR	Volume serial number
UXNWHERE	1 indicates job step setup processing
UXNERROR	2 indicates volume is shelf-resident
UXNGROUP	Storage group name
UXNUSEA	Volume use attribute
UXNWPROT	Write protection status
UXNCHKPT	Checkpoint volume indicator
UXNLOC	Volume location code
UXNSHLOC	Shelf location
UXNOWNER	Volume owner information
UXNCREAT	Volume record creation date
UXNENTEJ	Last entry or ejection date
UXNMOUNT	Last mounted date
UXNWRITE	Last written date
UXNEXPIR	Volume expiration date
UXNTDSI	Tape device selection information

Figure 24. CBRUXVNL Input During Job Step Setup—Existing TCDB Volume Record

Device Allocation

If a tape volume is inadvertently ejected from a tape library between job step setup processing and device allocation, the exit is invoked during device allocation to let the installation reenter the volume. This invocation occurs for the first or only volume of the request when there is no TCDB record or the volume is shelf-resident. The requested volume should be entered into the tape library dataserver in which it was resident during job step setup.

Note: Although there are circumstances in which the job may run successfully if the volume is entered into any tape library dataserver, it is recommended that the volume be entered into the library in which it was resident during job step setup.

Figure 25 on page 177 lists the contents of the exit input when a volume record does not exist in the TCDB.

Variable	Meaning
UXNVOLSR	Volume serial number
UXNWHERE	2 indicates device allocation processing
UXNERROR	1 indicates no TCDB record

Figure 25. CBRUXVNL Input During Device Allocation—No TCDB Volume Record

Figure 26 lists the contents of the exit input when a shelf-resident tape volume record exists in the TCDB.

Variable	Meaning
UXNVOLSR	Volume serial number
UXNWHERE	2 indicates device allocation processing
UXNERROR	2 indicates volume is shelf-resident
UXNGROUP	Storage group name
UXNUSEA	Volume use attribute
UXNWPROT	Write protection status
UXNCHKPT	Checkpoint volume indicator
UXNLOC	Volume location code
UXNSHLOC	Shelf location
UXNOWNER	Volume owner information
UXNCREAT	Volume record creation date
UXNENTEJ	Last entry or ejection date
UXNMOUNT	Last mounted date
UXNWRITE	Last written date
UXNEXPIR	Volume expiration date
UXNTDSI	Tape device selection information

Figure 26. CBRUXVNL Input During Device Allocation—Existing TCDB Volume Record

Library Mount Processing

If a tape volume is inadvertently ejected from a tape library between device allocation and library mount processing, the exit is invoked during library mount processing to let the installation reenter the volume. This exit is only invoked when the tape library dataserver fails a mount request because the tape volume is being ejected or cannot be found in the tape library dataserver. To prevent the CBR3646D message from being issued, the requested volume must be reentered into the tape library dataserver in which it was resident when the tape drive was allocated.

Figure 27 on page 178 lists the contents of the exit input when the volume record does not exist in the TCDB.

Variable	Meaning
UXNVOLSR	Volume serial number
UXNWHERE	3 indicates library mount processing
UXNERROR	1 indicates no volume record in the TCDB
UXNLIB	Library name to which the volume must be re-entered (target)
UXNLDEV	Library device type of the target library
UXNLCON	Library console name of the target library
UXNLTYP	Library logical type of the target library
UXNLDESC	Library description of the target library

Figure 27. CBRUXVNL Input Library Mount Processing—No TCDB Volume Record

Figure 28 lists the contents of the exit input when the volume record still exists in the TCDB.

Volume Not in Library Installation Exit Parameter List (CBRUXNPL)

Variable	Meaning
UXNVOLSR	Volume serial number
UXNWHERE	3 indicates library mount processing
UXNERROR	4 indicates volume is being ejected 3 indicates volume is in a different library 2 indicates volume is shelf-resident
UXNLIB	Library in which the volume must be re-entered (target)
UXNLDEV	Library device type of the target library
UXNLCON	Library console name of the target library
UXNLTYP	Library logical type of the target library
UXNLDESC	Library description of the target library
UXNLIBRS	Library in which the volume currently resides (might not be the same library as the target resident library)
UXNGROUP	Storage group name
UXNUSEA	Volume use attribute
UXNWPROT	Write protection status
UXNCHKPT	Checkpoint volume indicator
UXNLOC	Volume location code
UXNSHLOC	Shelf location
UXNOWNER	Volume owner information
UXNCREAT	Volume record creation date
UXNENTEJ	Last entry or ejection date
UXNMOUNT	Last mounted date
UXNWRITE	Last written date
UXNEXPIR	Volume expiration date
UXNTDSI	Tape device selection information

Figure 28. CBRUXVNL Input Library Mount Processing—Existing TCDB Volume Record

The volume not in library installation exit (CBRUXVNL) is passed by way of register 1, the pointer to a parameter list mapped by CBRUXNPL.

The installation exit, CBRUXVNL, cannot update the tape volume record. All fields in the volume not in library installation exit parameter list (CBRUXNPL) are input only. Figure 29 provides the format of CBRUXNPL.

```
UXNPL       DSECT ,              VOLUME NOT IN LIBRARY PARAMETER LIST
************************************************************************
*                                                                    *
* VOLUME NOT IN LIBRARY PARAMETERS: ALL FIELDS ARE INPUT ONLY AND    *
*                                   CAN NOT BE MODIFIED BY           *
*                                   INSTALLATION EXIT               *
*                                                                    *
************************************************************************
UXNPARM  DS    0D           CBRUXVNL PARAMETER SECTION
UXNWHERE DS    XL1          WHERE THE ERROR WAS FOUND
*                             1  JOB STEP SETUP PROCESSING
*                             2  DEVICE ALLOCATION PROCESSING
*                             3  LIBRARY MOUNT PROCESSING
UXNERROR DS    XL1          ERROR INDICATOR
*                             1  VOLUME RECORD NOT IN TCDB
*                             2  VOLUME IS SHELF RESIDENT
*                             3  VOLUME IN DIFFERENT LIBRARY
*                             4  VOLUME EJECT PENDING AND
*                                EJECT CANNOT BE CANCELED
         DS    CL6          RESERVED
UXNLIB   DS    CL8          LIBRARY NAME IN WHICH THE VOLUME SHOULD
*                             BE ENTERED OR BLANKS
UXNLDEV  DS    CL8          LIBRARY DEVICE TYPE OR BLANKS
UXNLCON  DS    CL8          LIBRARY CONSOLE NAME OR BLANKS
UXNLTYP  DS    CL1          LIBRARY LOGICAL TYPE OR BLANK
*                             'R' FOR AUTOMATED LIBRARY
*                             'M' FOR MANUAL LIBRARY
         DS    CL7          RESERVED
UXNLDESC DS    CL120        LIBRARY DESCRIPTION OR BLANKS
UXNVOLSR DS    CL6          VOLUME SERIAL NUMBER
         DS    CL2          RESERVED
UXNLIBRS DS    CL8          LIBRARY NAME IN WHICH THE VOLUME
*                             RESIDES OR "SHELF" OR BLANKS
UXNUSEA  DS    CL1          VOLUME USE ATTRIBUTE OR BLANKS
*                             'P' FOR PRIVATE
*                             'S' FOR SCRATCH
UXNWPROT DS    CL1          WRITE PROTECTION STATUS OR BLANK
*                             'Y' FOR WRITE-PROTECTED
*                             'N' FOR NOT WRITE-PROTECTED
UXNCHKPT DS    CL1          CHECKPOINT VOLUME INDICATOR OR BLANK
*                             'Y' FOR CHECKPOINT VOLUME
*                             'N' FOR NOT CHECKPOINT VOLUME
UXNLOC   DS    CL1          VOLUME LOCATION OR BLANK
*                             'L' FOR LIBRARY-RESIDENT
*                             'S' FOR SHELF-RESIDENT
UXNTDSI  DS    0F           TAPE DEVICE SELECTION INFORMATION
UXNREC   DS    XL1          TAPE RECORDING TECHNOLOGY OR ZERO
UXNMEDIA DS    XL1          MEDIA TYPE OR ZERO
UXNCOMP  DS    XL1          COMPACTION TYPE OR ZERO
UXNSPEC  DS    XL1          SPECIAL ATTRIBUTE OR ZERO
```

Figure 29. Volume Not in Library Installation Exit Parameter List—CBRUXNPL (Part 1 of 4)

```
UXNGROUP DS    CL8           STORAGE GROUP NAME OR BLANKS
UXNSHLOC DS    CL32          SHELF LOCATION OR BLANKS
UXNOWNER DS    CL64          VOLUME OWNER INFORMATION  OR BLANKS
         DS    CL8           RESERVED
UXNCREAT DS    CL10          VOLUME RECORD CREATION DATE YYYY-MM-DD
*                              OR BLANKS
UXNENTEJ DS    CL10          LAST ENTRY OR EJECTION DATE YYYY-MM-DD
*                              OR BLANKS
UXNMOUNT DS    CL10          LAST MOUNTED DATE         YYYY-MM-DD
*                              OR BLANKS
UXNWRITE DS    CL10          LAST WRITTEN DATE         YYYY-MM-DD
*                              OR BLANKS
UXNEXPIR DS    CL10          VOLUME EXPIRATION DATE    YYYY-MM-DD
*                              OR BLANKS
         DS    CL10          RESERVED
         DS    CL4           RESERVED
UXNEND   DS    0D            END OF CBRUXVNL PARAMETER SECTION
         SPACE 1
UXNPLLEN EQU   * - UXNPL     LENGTH OF THE PARAMETER LIST
***********************************************************************
*                                                                   *
*        RETURN CODES                                               *
*                                                                   *
***********************************************************************
UXNNORML EQU   0             PERFORM NORMAL PROCESSING
UXNRETRY EQU   4             RETRY THE FAILING OPERATION
UXNFAIL  EQU   8             CANCEL THE JOB STEP
UXNDONT  EQU   16            DO NOT CALL THE VOLUME NOT IN LIBRARY
*                              INSTALLATION EXIT AGAIN AND PERFORM
*                              NORMAL PROCESSING
         SPACE 1
***********************************************************************
*                                                                   *
*        WHERE CONSTANTS (UXNWHERE)                                 *
*                                                                   *
***********************************************************************
UXNSETUP EQU   1             DURING JOB SETUP PROCESSING
UXNALLOC EQU   2             DURING DEVICE ALLOCATION PROCESSING
UXNLBMNT EQU   3             DURING LIBRARY MOUNT PROCESSING
         SPACE 1
***********************************************************************
*                                                                   *
*        ERROR CONSTANTS (UXNERROR)                                 *
*                                                                   *
***********************************************************************
UXNNTCDB EQU   1             VOLUME RECORD NOT IN TCDB
UXNSHELF EQU   2             VOLUME IS SHELF RESIDENT
UXNDFRNT EQU   3             VOLUME IN DIFFERENT LIBRARY
UXNEJECT EQU   4             VOLUME EJECT PENDING AND
*                              EJECT CANNOT BE CANCELED
         SPACE 1
```

Figure 29. Volume Not in Library Installation Exit Parameter List—CBRUXNPL (Part 2 of 4)

```
***********************************************************************
*                                                                     *
*          LIBRARY LOGICAL TYPE CONSTANTS (UXNLTYP)                    *
*                                                                     *
***********************************************************************
UXNAUTO  EQU   C'R'           AUTOMATED/REAL LIBRARY
UXNMAN   EQU   C'M'           MANUAL LIBRARY
         SPACE 1
***********************************************************************
*                                                                     *
*          USE ATTRIBUTE CONSTANTS (UXNUSEA)                           *
*                                                                     *
***********************************************************************
UXNPRIV  EQU   C'P'           PRIVATE USE ATTRIBUTE
UXNSCRT  EQU   C'S'           SCRATCH USE ATTRIBUTE
         SPACE 1
***********************************************************************
*                                                                     *
*          LOCATION CONSTANTS (UXNLOC)                                 *
*                                                                     *
***********************************************************************
UXNLBRY  EQU   C'L'           LIBRARY RESIDENT
UXNSHLF  EQU   C'S'           SHELF RESIDENT
         SPACE 1
***********************************************************************
*                                                                     *
*          TAPE DEVICE SELECTION INFORMATION (TDSI) CONSTANTS          *
*                                                                     *
***********************************************************************
*          CONSTANTS TO DEFINE TAPE RECORDING TECHNOLOGY              *
***********************************************************************
UXNNOREC    EQU  0               RECORDING TECHNOLOGY UNKNOWN OR
*                                 UNSPECIFIED
UXN18TRK    EQU  1               READ/WRITE ON AN 18 TRACK DEVICE
UXN36TRK    EQU  2               READ/WRITE ON A  36 TRACK DEVICE
UXN128TRK   EQU  3               READ/WRITE ON A 128 TRACK DEVICE
UXN256TRK   EQU  4               READ/WRITE ON A 256 TRACK DEVICE
***********************************************************************
*          CONSTANTS TO DEFINE MEDIA TYPE                             *
***********************************************************************
UXNNOMED EQU   0             MEDIA TYPE UNKNOWN OR UNSPECIFIED
UXNMED1  EQU   1             MEDIA1 - CARTRIDGE SYSTEM TAPE
UXNMED2  EQU   2             MEDIA2 - ENHANCED CAPACITY CARTRIDGE
*                              SYSTEM TAPE
UXNMED3  EQU   3             MEDIA3 - HIGH PERFORMANCE CARTRIDGE TAPE
UXNMED4  EQU   4             MEDIA4 - EXTENDED HIGH PERFORMANCE CARTRIDGE
*                              TAPE
***********************************************************************
*          CONSTANTS TO DEFINE COMPACTION                             *
***********************************************************************
UXNCMPNS EQU   0             COMPACTION UNKNOWN OR NOT SET
UXNNOCMP EQU   1             NO COMPACTION
UXNIDRC  EQU   2             COMPACTION
```

Figure 29. Volume Not in Library Installation Exit Parameter List—CBRUXNPL (Part 3 of 4)

```
***********************************************************************
*         CONSTANTS TO DEFINE SPECIAL ATTRIBUTE                       *
***********************************************************************
UXNNOSPC EQU   0             VOLUME HAS NO SPECIAL ATTRIBUTE
UXNRDCOM EQU   1             VOLUME WILL BE MOUNTED FOR READ ONLY -
*                              ALL READ-COMPATIBLE DEVICES MAY BE
*                              SELECTED
         SPACE 1
***********************************************************************
*                                                                     *
*         MISCELLANEOUS CONSTANTS                                      *
*                                                                     *
***********************************************************************
UXNPLSP  EQU   230           SUBPOOL NUMBER
UXNYES   EQU   C'Y'          YES
UXNNO    EQU   C'N'          NO
UXNBLANK EQU   C' '          BLANK
```

Figure 29. Volume Not in Library Installation Exit Parameter List—CBRUXNPL (Part 4 of 4)

Storage is obtained below the line, from subpool 230, user key, for the installation exit parameter list.

Volume Not in Library Installation Exit Return Codes for Job Step Processing

The following return codes can be passed back to OAM from CBRUXVNL for job step setup processing:

Code   Meaning

0   Perform normal processing.

         The system allocates a stand-alone tape drive capable of handling the requested volume. If the required device type is not installed, the job or dynamic allocation fails.

4   Retry the failing operation.

         Locate the requested tape volume, using the tape management system inventory or other sources, and enter it into any tape library dataserver connected to the system on which the requesting job is running.

         The system rereads the tape volume record for the specified tape volume. If the tape volume record exists in the TCDB and the record indicates that the volume is library-resident, the system proceeds with normal library-resident tape volume processing. If the tape volume record exists but indicates that the tape volume is still shelf-resident, the CBR3646D message is issued to allow the operator to retry or cancel the job request.

         Note: CBRUXVNL is mostly used for old data sets, but new data sets can specify a specific volume serial number. When this occurs and the volume is entered into a tape library dataserver at the direction of CBRUXVNL, the library name is subsequently made available to the ACS routines. The ACS routines must assign a storage class and a tape storage group to the request; otherwise, the request fails.

8   Cancel.

         The job step or dynamic allocation is canceled.

16   Do not call the exit again.

CBRUXVNL is not invoked again until reactivated. The system allocates a stand-alone tape drive. If there is no stand-alone tape drive capable of handling the tape volume request, the job or dynamic allocation fails.

Volume Not in Library Installation Exit Return Codes for Device Allocation

The following return codes can be passed back to OAM from CBRUXVNL for device allocation processing:

Code   **Meaning**

0   Perform normal processing.

            The job step or dynamic allocation fails.

4   Retry the failing operation.

            Locate the requested tape volume, using the tape management system inventory or other sources, and enter it into the specific tape library dataserver in which it was previously resident when the job step was set up.

            The system rereads the tape volume record for the specified tape volume. If the tape volume record exists in the TCDB and the record indicates that the volume is library-resident, the system proceeds with normal library-resident tape volume processing. If the tape volume record does not exist or the tape volume record exists but indicates that the tape volume is still shelf-resident, the CBR3646D message is issued allowing the operator to retry or cancel the job request.

8   Cancel.

            The system cancels the job step or dynamic allocation.

16   Do not call the exit again.

            The job step or dynamic allocation fails. The installation exit is not called again until it is reactivated.

Volume Not in Library Installation Exit Return Codes for Library Mount Processing

The following return codes can be passed back to OAM from CBRUXVNL for library mount processing:

Code   **Meaning**

0   Perform normal processing.

            The job step or dynamic allocation is failed.

4   Retry the failing operation.

            Locate the requested volume, using the tape management system inventory or other sources, and reenter the volume into the tape library dataserver identified by the UXNLIB field of the installation exit parameter list.

            If the tape volume record still indicates that the tape volume is shelf-resident or the volume was entered into the wrong library, the CBR3646D message is issued. This message indicates which library the CBRUXVNL volume should be entered into and prompts the operator to retry or cancel the job request.

8   Cancel the job step.

The job step or dynamic allocation fails.

16   Do not call the exit again.

The job step or dynamic allocation fails. The exit is not called again.

If the installation returns a return code 16, indicating that the exit not be invoked again, or the installation exit is deactivated as the result of an abnormal termination or an invalid return code, the exit can be reactivated by stopping and restarting the OAM address space, or by issuing the LIBRARY RESET,CBRUXVNL command.

Volume Not in Library Installation Exit (CBRUXVNL) Usage Requirements

The volume not in library installation exit must reside in load module CBRUXVNL. It is invoked by way of the MVS LINK macro and must reside in a library in the LNKLST concatenation.

Since the volume not in library installation exit (CBRUXVNL) receives control through an MVS LINK macro, the addressing mode on entry to the exit may be either 24-bit or 31-bit addressing mode. Also, the installation exit can be executed above or below the 16-megabyte line. The addressing mode and the residency mode are determined by whatever AMODE (for addressing mode) or RMODE (for residency mode) characteristics are assigned to the load module when it is created by the MVS Linkage Editor and Loader or the MVS Program Binder.

Because the exit may be invoked in a key other than the job key:
* All storage dynamically acquired by the exit must be obtained from subpool 227, 228, 229, 230, 231, or 241.
* The exit must be written as a reentrant program and the resulting load module must be link-edited on the system as REENTRANT.

The following characteristics describe the execution environment in which the volume not in library installation exit is invoked:
* Task mode (not SRB mode)
* Unlocked
* Noncross memory mode (HASN = PASN = SASN)
* The 24-bit or 31-bit addressing mode depending on AMODE characteristics assigned when load module was created
* APF-authorized load module or in an APF-authorized library
* Primary ASC mode (not AR mode)
* Enabled for I/O external interrupts
* PSW key of the caller might not match the job key
* State of the caller

Mapping macro CBRUXNVL must be included by the installation exit.

Appendix A. SAMPLIB Members

This chapter contains sample library members that you can modify to suit your own business requirements.

Sample Library Members

This appendix contains information on sample library members for the following:

- CBRSPLCS, which is an example program that invokes the CBRXLCS programming interface.
- CBRUXCUA, CBRUXENT, CBRUXEJC, and CBRUXVNL installation exits. For more information on the specific installation exit that is illustrated in each of these SAMPLIB members, refer to "Chapter 7. Installation Exits" on page 149.
- CBRAPROC that is used to create member OAM in SYS1.PROCLIB.
- CBRSPSIM, CBRSPPIM, CBRSPSXP, and CBRSPPXP, which are four JCL samples that can be used for creating import or export list volumes.

The installation exits, as supplied by DFSMSrmm, are linked in SMP/E as reentrant. Installation exits CBRUXCUA and CBRUXVNL must be coded and link-edited on the system as reentrant. If multiple tape libraries are defined to the system, CBRUXENT and CBRUXEJC must also be coded and link-edited on the system as reentrant. To demonstrate this, and to provide multiple library support, the sample jobs for CBRUXCUA, CBRUXVNL, CBRUXENT, and CBRUXEJC are all coded as reentrant. The linkage editor parameters found in the prolog are used for each sample job. If you choose to code the installation exits as nonreentrant, you need to create the JCL to link-edit the exits as nonreentrant.

Note: These SAMPLIB members are available to you as part of the OS/390 product. Refer to them as examples for exits you may write to suit your own storage administration plan objectives.

Additionally, there are four sample JCL examples that are provided to illustrate the format and required files for both the import and export list volume. The JCL is commented with the expected format of each of the required files followed by some sample data, if applicable. The four JCL samples, shipped in SYS1.SAMPLIB, are:

- CBRSPSIM for import list volume (scratch request), see "SAMPLIB Member CBRSPSIM" on page 233
- CBRSPPIM for import list volume (private request), see "SAMPLIB Member CBRSPPIM" on page 235
- CBRSPSXP for export list volume (scratch request), see "SAMPLIB Member CBRSPSXP" on page 238
- CBRSPPXP for export list volume (private request), see "SAMPLIB Member CBRSPPXP" on page 241

Both scratch and private examples are provided; however, in order to allocate a scratch volume in a target library in an installation with multiple libraries, the ACS routines need to direct the device allocation for the scratch mount to a specific library. To accomplish this, use an exclusive storage group for each library. This ensures that based on the storage group selected by the ACS routines, the target library for the export or import operation will be the library selected for the scratch mount request. This is necessary since the import or export list volume must reside in the same library as the logical volumes intended for import or export processing.

To initiate the import or export operation from within the JCL, the specific volser examples invoke the CBRXLCS FUNC=EXPORT or FUNC=IMPORT functions using the CBRSPLCS sample program.

SAMPLIB Member CBRSPLCS

This SAMPLIB member is an example of a program that uses the CBRXLCS macro interface.

```
SPLCS    TITLE 'CBRSPLCS - SAMPLE INSTALLATION MANAGEMENT PACKAGE'
CBRSPLCS START 0                      SAMPLE INSTALLATION MGMT PACKAGE
         SPACE 2
**** START OF SPECIFICATIONS ******************************************
*                                                                    *
*    MODULE NAME:       CBRSPLCS                                      *
*                                                                    *
*    DESCRIPTIVE NAME:  SAMPLE INSTALLATION MANAGEMENT PACKAGE FOR    *
*                       AUTOMATED TAPE LIBRARIES                      *
*                                                                    *
*    FUNCTION:                                                        *
*      MODULE CBRSPLCS IS PART OF THE SAMPLE INSTALLATION             *
*      MANAGEMENT PACKAGE FOR AUTOMATED TAPE LIBRARIES.  IT HANDLES   *
*      REQUESTS ENTERED VIA AN INPUT TRANSACTION DATASET:            *
*         1. EJECT A VOLUME FROM A LIBRARY                            *
*         2. CHANGE A VOLUME USE ATTRIBUTE TO SCRATCH                 *
*         3. CHANGE A VOLUME USE ATTRIBUTE TO PRIVATE                 *
*         4. INITIATE AN IMPORT OPERATION                             *
*         5. INITIATE AN EXPORT OPERATION                             *
*                                                                    *
*      CBRSPLCS DEMONSTRATES THE USE OF THE FOLLOWING FUNCTIONS:      *
*         1. THE "QUERY VOLUME RESIDENCE" FUNCTION OF CBRXLCS, USED   *
*            TO DETERMINE WHETHER A VOLUME RESIDES IN A LIBRARY.      *
*         2. THE "CHANGE USE ATTRIBUTE" FUNCTION OF CBRXLCS, USED     *
*            TO CHANGE THE USE ATTRIBUTE OF A VOLUME TO SCRATCH OR    *
*            TO PRIVATE.                                              *
*         3. THE "EJECT" FUNCTION OF CBRXLCS, USED TO EJECT A VOLUME  *
*            FROM A LIBRARY, USING EITHER THE CONVENIENCE OUTPUT      *
*            STATION OR THE HIGH CAPACITY OUTPUT STATION.             *
*         4. THE ABILITY TO PASS 16 CHARACTERS OF INFORMATION TO      *
*            THE CHANGE USE ATTRIBUTE INSTALLATION EXIT AND TO THE    *
*            CARTRIDGE EJECT INSTALLATION EXIT.  THE CHARACTER STRING *
*            PASSED HERE CONTAINS AN AUTHORIZATION CODE, SO THAT THE  *
*            EXIT CAN DETERMINE THE SOURCE OF THE REQUEST.            *
*         5. THE "IMPORT" FUNCTION OF CBRXLCS INITIATES AN IMPORT     *
*            OPERATION FOR A VOLUME OR VOLUMES INTO A LIBRARY OR      *
*            TO CANCEL AN IMPORT OPERATION THAT'S ALREADY IN          *
*            PROCESS.                                                 *
*         6. THE "EXPORT" FUNCTION OF CBRXLCS INITIATES AN EXPORT     *
*            OPERATION FOR A VOLUME OR VOLUMES FROM A LIBRARY OR      *
*            TO CANCEL AN EXPORT OPERATION THAT'S ALREADY IN          *
*            PROCESS.                                                 *
```

Figure 30. Sample Installation Management Package—CBRSPLCS (Part 1 of 12)

```
*                                                             *
*     NOTES:                                                  *
*                                                             *
*        CHARACTER CODE:        EBCDIC                        *
*                                                             *
*        RESTRICTIONS:          NONE                          *
*                                                             *
*        REGISTER CONVENTIONS:                                *
*          R0  - STANDARD LINKAGE REGISTER                    *
*              - REASON CODE REGISTER                         *
*              - WORK REGISTER                                *
*          R1  - STANDARD LINKAGE REGISTER                    *
*              - WORK REGISTER                                *
*          R2  - NOT USED                                     *
*          R3  - NOT USED                                     *
*          R4  - NOT USED                                     *
*          R5  - NOT USED                                     *
*          R6  - NOT USED                                     *
*          R7  - NOT USED                                     *
*          R8  - NOT USED                                     *
*          R9  - LINKAGE REGISTER TO INTERNAL SUBROUTINES     *
*          R10 - NOT USED                                     *
*          R11 - NOT USED                                     *
*          R12 - CBRSPLCS BASE REGISTER                       *
*          R13 - STANDARD LINKAGE REGISTER                    *
*              - SAVE AREA ADDRESS                            *
*          R14 - STANDARD LINKAGE REGISTER                    *
*              - RETURN POINT ADDRESS                         *
*              - WORK REGISTER                                *
*          R15 - STANDARD LINKAGE REGISTER                    *
*              - ENTRY POINT ADDRESS                          *
*              - RETURN CODE REGISTER                         *
*              - WORK REGISTER                                *
*                                                             *
*     MODULE TYPE:              CONTROL SECTION               *
*                                                             *
*        PROCESSOR:             ASSEMBLER H                   *
*                                                             *
*        ATTRIBUTES:                                          *
*                                                             *
*          LOCATION:            JOB PACK AREA                 *
*          STATE:               PROBLEM                       *
*          AMODE:               24                            *
*          RMODE:               24                            *
*          KEY:                 8                             *
*          MODE:                TASK                          *
*          SERIALIZATION:       UNLOCKED                      *
*          TYPE:                SERIALLY REUSABLE             *
*          AUTHORIZATION:       APF AUTHORIZED                *
```

Figure 30. Sample Installation Management Package—CBRSPLCS (Part 2 of 12)

```
*                                                                    *
*       LINKAGE:                STANDARD LINKAGE CONVENTIONS          *
*                                                                    *
*       CALLING SEQUENCE:                                            *
*         CBRSPLCS IS INVOKED DIRECTLY FROM A JCL EXEC STATEMENT.    *
*                                                                    *
*       INPUT:                                                       *
*         INPUT TRANSACTIONS ARE CONTAINED IN DATASET INDD.  EACH    *
*         TRANSACTION CONTAINS THE FOLLOWING INFORMATION:            *
*           1. A TRANSACTION CODE, WHICH INDICATES THE REQUESTED     *
*              FUNCTION:  EJECT, CHANGE THE USE ATTRIBUTE TO SCRATCH,*
*              CHANGE THE USE ATTRIBUTE TO PRIVATE, IMPORT OR        *
*              EXPORT.                                               *
*           2. A TRANSACTION MODIFIER, WHICH INDICATES WHETHER TO    *
*              VERIFY THAT THE VOLUME RESIDES IN A LIBRARY BEFORE    *
*              ATTEMPTING THE FUNCTION IN THE TRANSACTION CODE.  NOTE*
*              THAT CUA MAY BE PERFORMED ON A SHELF-RESIDENT VOLUME, *
*              PROVIDED THAT THERE IS A TAPE VOLUME RECORD IN THE    *
*              TAPE CONFIGURATION DATA BASE, AND THEREFORE THAT THE  *
*              MODIFIER MAY BE USED TO PREVENT THIS.                 *
*           3. THE VOLUME SERIAL NUMBER.                             *
*           4. FOR A REQUEST TO CHANGE THE USE ATTRIBUTE TO PRIVATE, *
*              THE STORAGE GROUP NAME.  THIS MAY BE SUPPLIED AS      *
*              BLANKS.  THE CUA INSTALLATION EXIT MAY THEN SUPPLY A  *
*              NON-BLANK VALUE OR LEAVE THE BLANK STORAGE GROUP NAME *
*              UNCHANGED.                                            *
*           5. FOR AN EJECT REQUEST, A CODE TO SELECT EITHER THE     *
*              CONVENIENCE OUTPUT STATION OR THE HIGH CAPACITY OUTPUT*
*              STATION.                                              *
*           6. FOR AN IMPORT REQUEST, A CODE TO INITIATE A CANCEL    *
*              TO TERMINATE THE IMPORT FUNCTION.                     *
*           7. FOR AN EXPORT REQUEST, A CODE TO INITIATE A CANCEL    *
*              TO TERMINATE THE EXPORT FUNCTION.                     *
*                                                                    *
*       OUTPUT:                                                      *
*         A MESSAGE DESCRIBING THE RESULTS OF PROCESSING IS BUILT    *
*         FOLLOWING THE INPUT TRANSACTION.  THE COMBINED TRANSACTION *
*         AND MESSAGE ARE THEN WRITTEN TO DATASET OUTDD AND TO THE   *
*         TAPE POOL AND TAPE LIBRARY CONSOLE DESTINATIONS.           *
*                                                                    *
*       EXIT NORMAL:                                                 *
*         RETURN TO THE CALLER WITH RETURN CODE ZERO.                *
*                                                                    *
*       EXIT ERROR:  NONE                                            *
*                                                                    *
*     EXTERNAL REFERENCES:                                           *
*                                                                    *
*       ROUTINES:  NONE                                              *
*                                                                    *
*       CONTROL BLOCKS:  NONE                                        *
```

Figure 30. Sample Installation Management Package—CBRSPLCS (Part 3 of 12)

```
*                                                                      *
*      EXECUTABLE MACROS:                                              *
*        CBRXLCS                                                       *
*        CLOSE                                                         *
*        GET                                                           *
*        OPEN                                                          *
*        PUT                                                           *
*        RETURN                                                        *
*        SAVE                                                          *
*        WTO                                                           *
*                                                                      *
*      MESSAGES:  NONE                                                 *
*                                                                      *
*      ABEND CODES:  NONE                                              *
*                                                                      *
*                                                                      *
**** END OF SPECIFICATIONS ********************************************
         TITLE 'STANDARD REGISTER DEFINITIONS'
*--------------------------------------------------------------------*
*                                                                      *
*         STANDARD REGISTER DEFINITIONS                               *
*                                                                      *
*--------------------------------------------------------------------*
R0       EQU   0                     GENERAL REGISTER 0
R1       EQU   1                     GENERAL REGISTER 1
R2       EQU   2                     GENERAL REGISTER 2
R3       EQU   3                     GENERAL REGISTER 3
R4       EQU   4                     GENERAL REGISTER 4
R5       EQU   5                     GENERAL REGISTER 5
R6       EQU   6                     GENERAL REGISTER 6
R7       EQU   7                     GENERAL REGISTER 7
R8       EQU   8                     GENERAL REGISTER 8
R9       EQU   9                     GENERAL REGISTER 9
R10      EQU   10                    GENERAL REGISTER 10
R11      EQU   11                    GENERAL REGISTER 11
R12      EQU   12                    GENERAL REGISTER 12
R13      EQU   13                    GENERAL REGISTER 13
R14      EQU   14                    GENERAL REGISTER 14
R15      EQU   15                    GENERAL REGISTER 15
         TITLE 'CBRLCSPL - LCS EXTERNAL SERVICES PARAMETER LIST'
         CBRLCSPL  ,                 LCS EXTERNAL SERVICES PARM LIST
         TITLE 'CBRSPLCS - SAMPLE INSTALLATION MANAGEMENT PACKAGE'
*--------------------------------------------------------------------*
*                                                                      *
*         CBRSPLCS ENTRY POINT                                        *
*                                                                      *
*--------------------------------------------------------------------*
```

Figure 30. Sample Installation Management Package—CBRSPLCS (Part 4 of 12)

```
          CBRSPLCS CSECT ,                    SAMPLE INSTALLATION MGMT PACKAGE
          CBRSPLCS AMODE 24
          CBRSPLCS RMODE 24
                   SAVE  (14,12),,            SAVE CALLER'S REGISTERS AND      +
                         'CBRSPLCS&SYSDATE'    MARK ENTRY POINT
                   LR    R12,R15              COPY ENTRY POINT ADDRESS
                   USING CBRSPLCS,R12         CBRSPLCS BASE REGISTER
                   ST    R13,SAVE+4           BACKWARD CHAIN SAVE AREAS
                   LA    R0,SAVE              CBRSPLCS SAVE AREA ADDRESS
                   ST    R0,8(,R13)           FORWARD CHAIN SAVE AREAS
                   LR    R13,R0               SET CBRSPLCS SAVE AREA ADDRESS
                   SPACE 2
          *---------------------------------------------------------------------*
          *                                                                     *
          *       OPEN BOTH DATA CONTROL BLOCKS                                 *
          *                                                                     *
          *---------------------------------------------------------------------*
                   OPEN  (INDCB,(INPUT),OUTDCB,(OUTPUT))  OPEN BOTH DCBS
                   SPACE 2
          *---------------------------------------------------------------------*
          *                                                                     *
          *       READ AND PROCESS THE INPUT TRANSACTION REQUEST DATASET        *
          *                                                                     *
          *---------------------------------------------------------------------*
          CUA1000  DS    0H
                   GET   INDCB,TRANSACT       READ FIRST/NEXT TRANSACTION
                   EJECT ,
          *---------------------------------------------------------------------*
          *                                                                     *
          *       VERIFY THAT THE VOLUME RESIDES IN A LIBRARY, IF REQUESTED     *
          *                                                                     *
          *---------------------------------------------------------------------*
                   CLI   TRANMOD,TRANVER      VERIFY VOLUME IN LIBRARY?
                   BNE   CUA2000              NO. GO CHECK REQUEST TYPE
                   BAL   R9,CUACOPY           COPY MODEL TO LCS PARAMETER LIST
                   CBRXLCS  TYPE=TAPE,        QUERY VOLUME RESIDENCE CALL       +
                         FUNC=QVR,                                             +
                         VOLUME=TRANVOL,                                       +
                         MF=(E,LCSLIST)
                   LTR   R15,R15              VOLUME IN LIBRARY?
                   BZ    CUA2000              YES. GO CHECK REQUEST TYPE
                   C     R15,=A(LCSWARN)      WARNING RETURN CODE?
                   BNE   CUA1100              NO. FORMAT ERROR MESSAGE
                   C     R0,=A(LCSFNLRS)      VOLUME NOT LIBRARY RESIDENT?
                   BNE   CUA1100              NO. FORMAT ERROR MESSAGE
                   MVC   TRANMSG,=CL45'NOT IN LIBRARY'  SET TRANS RESPONSE
                   BAL   R9,CUARESP           WRITE TRANSACTION RESPONSE
                   B     CUA1000              GET NEXT TRANSACTION
```

Figure 30. Sample Installation Management Package—CBRSPLCS (Part 5 of 12)

```
CUA1100  DS    0H
         MVC   ERRFUNC,=CL5'QVR'    SET ERROR FUNCTION
         BAL   R9,CUACODES          FORMAT RETURN AND REASON CODES
         BAL   R9,CUARESP           WRITE TRANSACTION RESPONSE
         B     CUA1000              GET NEXT TRANSACTION
         EJECT ,
*-------------------------------------------------------------------*
*                                                                   *
*        EJECT A VOLUME FROM ITS LIBRARY, IF REQUESTED              *
*                                                                   *
*-------------------------------------------------------------------*
CUA2000  DS    0H
         CLI   TRANCODE,TRANEJCT    EJECT VOLUME FROM LIBRARY?
         BNE   CUA3000              NO. CHECK CHANGE USE ATTRIBUTE
         BAL   R9,CUACOPY           COPY MODEL TO LCS PARAMETER LIST
         CLI   TRANDEST,TRANBULK    BULK EJECT REQUEST?
         BNE   CUA2100              NO. ISSUE EJECT REQUEST
         CBRXLCS  BULKEJCT=YES,     EJECT TO BULK OUTPUT STATION     +
               MF=(M,LCSLIST)
CUA2100  DS    0H
         CBRXLCS  TYPE=TAPE,        EJECT VOLUME FROM LIBRARY        +
               FUNC=EJECT,                                           +
               VOLUME=TRANVOL,                                       +
               EXITINFO=PASSTHRU,                                    +
               MF=(E,LCSLIST)
         LTR   R15,R15              EJECT SUCCESSFULLY SCHEDULED?
         BNZ   CUA2200              NO. FORMAT ERROR MESSAGE
         MVC   TRANMSG,=CL45'EJECT SCHEDULED'  SET TRANS RESPONSE
         BAL   R9,CUARESP           WRITE TRANSACTION RESPONSE
         B     CUA1000              GET NEXT TRANSACTION
CUA2200  DS    0H
         MVC   ERRFUNC,=CL5'EJECT'  SET ERROR FUNCTION
         BAL   R9,CUACODES          FORMAT RETURN AND REASON CODES
         BAL   R9,CUARESP           WRITE TRANSACTION RESPONSE
         B     CUA1000              GET NEXT TRANSACTION
         EJECT ,
*-------------------------------------------------------------------*
*                                                                   *
*        CHANGE THE VOLUME USE ATTRIBUTE, IF REQUESTED              *
*                                                                   *
*-------------------------------------------------------------------*
CUA3000  DS    0H
         CLI   TRANCODE,TRANCHGP    CHANGE USE ATTRIBUTE TO PRIVATE?
         BNE   CUA3100              NO. CHECK CHANGE TO SCRATCH
         BAL   R9,CUACOPY           COPY MODEL TO LCS PARAMETER LIST
         CBRXLCS  USE=PRIVATE,      CHANGE USE ATTRIBUTE TO PRIVATE  +
               GRPNAME=TRANSGRP,     STORAGE GROUP NAME OR BLANKS    +
               MF=(M,LCSLIST)
         B     CUA3200              GO INVOKE LCS EXTERNAL SERVICES
```

Figure 30. Sample Installation Management Package—CBRSPLCS (Part 6 of 12)

```
        CUA3100 DS    0H
                CLI   TRANCODE,TRANCHGS   CHANGE USE ATTRIBUTE TO SCRATCH?
                BNE   CUA4000             NO. INVALID TRANSACTION CODE
                BAL   R9,CUACOPY          COPY MODEL TO LCS PARAMETER LIST
                CBRXLCS USE=SCRATCH,      CHANGE USE ATTRIBUTE TO SCRATCH    +
                      MF=(M,LCSLIST)
        CUA3200 DS    0H
                CBRXLCS TYPE=TAPE,        CHANGE USE ATTRIBUTE CALL          +
                      FUNC=CUA,                                             +
                      VOLUME=TRANVOL,                                       +
                      EXITINFO=PASSTHRU,                                    +
                      MF=(E,LCSLIST)
                LTR   R15,R15             USE ATTRIBUTE CHANGED?
                BNZ   CUA3300             NO. FORMAT ERROR MESSAGE
                MVC   TRANMSG,=CL45'USE ATTRIBUTE CHANGED'  SET TRANS RESPONSE
                BAL   R9,CUARESP          WRITE TRANSACTION RESPONSE
                B     CUA1000             GET NEXT TRANSACTION
        CUA3300 DS    0H
                C     R15,=A(LCSWARN)     WARNING RETURN CODE?
                BNE   CUA3500             NO. FORMAT ERROR MESSAGE
                C     R0,=A(LCSWVAS)      VOLUME ALREADY SCRATCH?
                BE    CUA3400             YES. FORMAT NOT CHANGED MESSAGE
                C     R0,=A(LCSWVAP)      VOLUME ALREADY PRIVATE?
                BNE   CUA3500             NO. FORMAT ERROR MESSAGE
        CUA3400 DS    0H
                MVC   TRANMSG,=CL45'USE ATTRIBUTE NOT CHANGED'  SET TRANS RESP
                BAL   R9,CUARESP          WRITE TRANSACTION RESPONSE
                B     CUA1000             GET NEXT TRANSACTION
        CUA3500 DS    0H
                MVC   ERRFUNC,=CL5'CUA'   SET ERROR FUNCTION
                BAL   R9,CUACODES         FORMAT RETURN AND REASON CODES
                BAL   R9,CUARESP          WRITE TRANSACTION RESPONSE
                B     CUA1000             GET NEXT TRANSACTION
                EJECT ,
        *----------------------------------------------------------------------*
        *                                                                      *
        *       IMPORT FUNCTION                                                *
        *                                                                      *
        *----------------------------------------------------------------------*
        CUA4000 DS    0H
                CLI   TRANCODE,TRANIMP    IMPORT VOL INTO A VTS LIBRARY
                BNE   CUA5000             NO. CHECK FOR EXPORT
                BAL   R9,CUACOPY          COPY MODEL TO LCS PARM LIST
                CLI   TRANCOPT,TRANCAN    CANCEL IMPORT REQUEST?
                BNE   CUA4100             IMPORT VOL INTO A VTS LIBRARY
                CBRXLCS TYPE=TAPE,        CANCEL IMPORT REQUEST              +
                      FUNC=IMPORT,                                          +
                      VOLUME=TRANVOL,                                       +
                      CANCEL=YES,                                           +
                      MF=(E,LCSLIST)
```

Figure 30. Sample Installation Management Package—CBRSPLCS (Part 7 of 12)

```
        LTR   R15,R15              IMPORT CANCEL SUCCESSFULLY?
        BNZ   CUA4200             NO. FORMAT ERROR MESSAGE
        MVC   TRANMSG,=CL45'IMPORT CANCELED'  SET TRANS RESPONSE
        BAL   R9,CUARESP          WRITE TRANSACTION RESPONSE
        B     CUA1000             GET NEXT TRANSACTION
CUA4100 DS    0H
        CBRXLCS  TYPE=TAPE,        IMPORT VOLUME INTO A VTS LIBRARY   +
              FUNC=IMPORT,                                            +
              VOLUME=TRANVOL,                                         +
              MF=(E,LCSLIST)
        LTR   R15,R15              IMPORT SUCCESSFULLY?
        BNZ   CUA4200             NO. FORMAT ERROR MESSAGE
        MVC   TRANMSG,=CL45'IMPORT SCHEDULED'  SET TRANS RESPONSE
        BAL   R9,CUARESP          WRITE TRANSACTION RESPONSE
        B     CUA1000             GET NEXT TRANSACTION
CUA4200 DS    0H
        MVC   ERRFUNC,=CL5'IMP'   SET ERROR FUNCTION
        BAL   R9,CUACODES         FORMAT RETURN AND REASON CODES
        BAL   R9,CUARESP          WRITE TRANSACTION RESPONSE
        B     CUA1000             GET NEXT TRANSACTION
        EJECT ,
*---------------------------------------------------------------------*
*                                                                     *
*       EXPORT FUNCTION                                               *
*                                                                     *
*---------------------------------------------------------------------*
CUA5000 DS    0H
        CLI   TRANCODE,TRANEXP    EXPORT VOLUME FROM LIBRARY?
        BNE   CUA6000             NO. INVALID TRANSACTION CODE
        BAL   R9,CUACOPY          COPY MODEL TO LCS PARM LIST
        CLI   TRANCOPT,TRANCAN    CANCEL EXPORT REQUEST
        BNE   CUA5100             EXPORT VOL FROM A VTS LIBRARY
        CBRXLCS  TYPE=TAPE,        CANCEL EXPORT REQUEST             +
              FUNC=EXPORT,                                           +
              VOLUME=TRANVOL,                                        +
              CANCEL=YES,                                            +
              MF=(E,LCSLIST)
        LTR   R15,R15              EXPORT CANCEL SUCCESSFULLY?
        BNZ   CUA5200             NO. FORMAT ERROR MESSAGE
        MVC   TRANMSG,=CL45'EXPORT CANCELED'  SET TRANS RESPONSE
        BAL   R9,CUARESP          WRITE TRANSACTION RESPONSE
        B     CUA1000             GET NEXT TRANSACTION
CUA5100 DS    0H
        CBRXLCS  TYPE=TAPE,        EXPORT VOLUME FROM A VTS LIBRARY   +
              FUNC=EXPORT,                                            +
              VOLUME=TRANVOL,                                         +
              MF=(E,LCSLIST)
        LTR   R15,R15              EXPORT SUCCESSFULLY?
        BNZ   CUA5200             NO. FORMAT ERROR MESSAGE
        MVC   TRANMSG,=CL45'EXPORT SCHEDULED'  SET TRANS RESPONSE
        BAL   R9,CUARESP          WRITE TRANSACTION RESPONSE
        B     CUA1000             GET NEXT TRANSACTION
```

Figure 30. Sample Installation Management Package—CBRSPLCS (Part 8 of 12)

```
CUA5200  DS    0H
         MVC   ERRFUNC,=CL5'EXP'     SET ERROR FUNCTION
         BAL   R9,CUACODES          FORMAT RETURN AND REASON CODES
         BAL   R9,CUARESP           WRITE TRANSACTION RESPONSE
         B     CUA1000              GET NEXT TRANSACTION
         EJECT ,
*---------------------------------------------------------------------*
*                                                                     *
*        INVALID TRANSACTION CODE REQUESTED                           *
*                                                                     *
*---------------------------------------------------------------------*
CUA6000  DS    0H
         MVC   TRANMSG,=CL45'INVALID TRANSACTION CODE'  SET TRANS RESP
         BAL   R9,CUARESP           WRITE TRANSACTION RESPONSE
         B     CUA1000              GET NEXT TRANSACTION
         EJECT ,
*---------------------------------------------------------------------*
*                                                                     *
*        CLEAN UP AND RETURN TO THE CALLER                            *
*                                                                     *
*---------------------------------------------------------------------*
EXIT     DS    0H
         CLOSE (INDCB,,OUTDCB)      CLOSE BOTH DATA CONTROL BLOCKS
         L     R13,SAVE+4           RESTORE CALLER'S SAVE AREA ADDRESS
         RETURN (14,12),            RESTORE CALLER'S REGISTERS, THEN   +
               RC=0                    RETURN TO CALLER
         EJECT ,
*---------------------------------------------------------------------*
*                                                                     *
*        COPY THE MODEL LCS PARAMETER LIST TO THE ACTUAL LIST         *
*                                                                     *
*---------------------------------------------------------------------*
CUACOPY  DS    0H
         LA    R0,LCSMODEL          ADDRESS OF SOURCE
         LA    R1,LCSPLENG          LENGTH OF SOURCE
         LA    R14,LCSLIST          ADDRESS OF TARGET
         LR    R15,R1               LENGTH OF TARGET
         MVCL  R14,R0               COPY MODEL TO LCS PARAMETER LIST
         BR    R9                   RETURN TO CALLER
         EJECT ,
*---------------------------------------------------------------------*
*                                                                     *
*        FORMAT THE RETURN AND REASON CODES FOR PRINTING              *
*                                                                     *
*---------------------------------------------------------------------*
```

Figure 30. Sample Installation Management Package—CBRSPLCS (Part 9 of 12)

```
CUACODES DS    0H
         CVD   R15,PRETCODE       CONVERT TO PACKED DECIMAL
         UNPK  ZRETCODE,PRETCODE  CONVERT TO ZONED DECIMAL
         OI    ZRETCODE+3,X'F0'   CORRECT FINAL ZONE
         CVD   R0,PRSNCODE        CONVERT TO PACKED DECIMAL
         UNPK  ZRSNCODE,PRSNCODE  CONVERT TO ZONED DECIMAL
         OI    ZRSNCODE+3,X'F0'   CORRECT FINAL ZONE
         MVC   TRANMSG,RETREAS    MOVE TEXT TO RESPONSE AREA
         BR    R9                 RETURN TO CALLER
         EJECT ,
*-------------------------------------------------------------------*
*                                                                   *
*        WRITE THE TRANSACTION RESPONSE                             *
*                                                                   *
*-------------------------------------------------------------------*
CUARESP  DS    0H
         PUT   OUTDCB,TRANSACT    WRITE TRANSACTION RESPONSE
         WTO   TEXT=TRANLEN,      WRITE RESPONSE TO OPERATOR       +
               ROUTCDE=(3,5)       SEND TO TAPE POOL, TAPE LIBRARY
         BR    R9                 RETURN TO CALLER
         TITLE 'CONSTANTS AND WORK AREAS'
*-------------------------------------------------------------------*
*                                                                   *
*        CONSTANTS AND WORK AREAS                                   *
*                                                                   *
*-------------------------------------------------------------------*
         LTORG ,                  LITERAL CONSTANTS
         EJECT ,
*-------------------------------------------------------------------*
*                                                                   *
*        DATA CONTROL BLOCKS                                        *
*                                                                   *
*-------------------------------------------------------------------*
INDCB    DCB   DDNAME=INDD,       INPUT:  TRANSACTION REQUESTS     +
               DSORG=PS,                                           +
               MACRF=GM,                                           +
               EODAD=EXIT
         EJECT ,
OUTDCB   DCB   DDNAME=OUTDD,      OUTPUT:  RESULT NOTIFICATION     +
               MACRF=PM,                                           +
               DSORG=PS,                                           +
               RECFM=FB,                                           +
               LRECL=80,                                           +
               BLKSIZE=400
         EJECT ,
*-------------------------------------------------------------------*
*                                                                   *
*        CBRSPLCS TRANSACTION RECORD AND RESPONSE AREA              *
*                                                                   *
*-------------------------------------------------------------------*
```

Figure 30. Sample Installation Management Package—CBRSPLCS (Part 10 of 12)

```
       TRANLEN  DC    AL2(L'TRANSACT)    LENGTH FOR WTO TEXT
       TRANSACT DS    0CL80              TRANSACTION RECORD
       TRANCODE DS    CL1                TRANSACTION CODE
       TRANEJCT EQU   C'E'               EJECT VOLUME FROM LIBRARY
       TRANCHGP EQU   C'P'               CHANGE VOLUME USE ATTRIBUTE TO
       *                                    PRIVATE
       TRANCHGS EQU   C'S'               CHANGE VOLUME USE ATTRIBUTE TO
       *                                    SCRATCH
       TRANIMP  EQU   C'I'               IMPORT FUNCTION
       TRANEXP  EQU   C'X'               EXPORT FUNCTION
       TRANMOD  DS    CL1                TRANSACTION CODE MODIFIER
       TRANVER  EQU   C'V'               VERIFY VOLUME RESIDES IN LIBRARY
       *                                    BEFORE EXECUTING REQUEST
                DS    CL1                SEPARATOR
       TRANVOL  DS    CL6                VOLUME SERIAL NUMBER
                DS    CL1                SEPARATOR
       TRANSPEC DS    CL25               REQUEST-SPECIFIC AREA
                ORG   TRANSPEC           VOLUME EJECT SECTION
       TRANDEST DS    CL1                EJECT DESTINATION
       TRANCONV EQU   C'C'               CONVENIENCE OUTPUT STATION
       TRANBULK EQU   C'B'               HIGH CAPACITY OUTPUT STATION
                ORG   TRANSPEC           IMPORT/EXPORT SECTION
       TRANCOPT DS    CL1                CANCEL AREA
       TRANCAN  EQU   C'C'               CANCEL REQUEST
                ORG   TRANSPEC           CHANGE USE ATTRIBUTE SECTION
       TRANSGRP DS    CL8                STORAGE GROUP NAME FOR CHANGE TO
       *                                    PRIVATE
                ORG   ,                  RESTORE LOCATION COUNTER
       TRANMSG  DS    CL45               TRANSACTION COMPLETION MESSAGE
                EJECT ,
       *----------------------------------------------------------------*
       *                                                                *
       *        CBRXLCS PARAMETER LISTS                                 *
       *                                                                *
       *----------------------------------------------------------------*
                CBRXLCS  MF=(L,LCSLIST)  LCS EXTERNAL SERVICES PARM LIST
                SPACE 2
                CBRXLCS  MF=(L,LCSMODEL) LCS EXTERNAL SERVICES MODEL LIST
                EJECT ,
       *----------------------------------------------------------------*
       *                                                                *
       *        MISCELLANEOUS WORK AREAS                                *
       *                                                                *
       *----------------------------------------------------------------*
       SAVE     DC    18F'0'             STANDARD SAVE AREA
                SPACE 2
       PRETCODE DC    D'0'               CBRXLCS RETURN CODE - PACKED DEC
       PRSNCODE DC    D'0'               CBRXLCS REASON CODE - PACKED DEC
                SPACE 2
       RETREAS  DS    0CL45
       ERRFUNC  DC    CL5' '             QVR, CUA, EJECT, IMP OR EXP
                DC    CL15' RETURN CODE = '
```

Figure 30. Sample Installation Management Package—CBRSPLCS (Part 11 of 12)

```
ZRETCODE DC    CL4' '               CBRXLCS RETURN CODE - ZONED DEC
         DC    CL16', REASON CODE = '
ZRSNCODE DC    CL4' '               CBRXLCS REASON CODE - ZONED DEC
         DC    CL1'.'
         SPACE 2
PASSTHRU DC    CL16'SIMP'           PASSTHRU VALUE FOR EJECT, CUA
         SPACE 2
         END   CBRSPLCS
```

Figure 30. Sample Installation Management Package—CBRSPLCS (Part 12 of 12)

SAMPLIB Member CBRSPUXC

This SAMPLIB member is a sample change use attribute installation exit.

```
UXCUA    TITLE 'CBRUXCUA - SAMPLE CHANGE USE ATTRIBUTE INST. EXIT'
CBRUXCUA START 0           SAMPLE CHANGE USE ATTRIBUTE INSTALLATION EXIT
         SPACE 2
**** START OF SPECIFICATIONS ******************************************
*                                                                    *
*    MODULE NAME:       CBRUXCUA                                      *
*                                                                    *
*    DESCRIPTIVE NAME:  SAMPLE CHANGE USE ATTRIBUTE INSTALLATION      *
*                       EXIT                                          *
*                                                                    *
*    FUNCTION:                                                        *
*      MODULE CBRUXCUA IS INVOKED EACH TIME A REQUEST IS MADE TO      *
*      CHANGE THE VOLUME USE ATTRIBUTE OF AN SMS-MANAGED TAPE         *
*      VOLUME.  CBRUXCUA MAY REFUSE TO ALLOW THE VOLUME USE           *
*      ATTRIBUTE TO BE CHANGED, OR UPDATE CERTAIN FIELDS IN THE TAPE  *
*      VOLUME RECORD, OR APPROVE THE CHANGE USE ATTRIBUTE REQUEST     *
*      WITHOUT CHANGE.                                                *
*                                                                    *
*      CBRUXCUA DEMONSTRATES THE USE OF THE FOLLOWING FUNCTIONS:      *
*      1. SETTING THE "REJECT" RETURN CODE TO PREVENT A CHANGE IN     *
*         THE VOLUME USE ATTRIBUTE.                                   *
*      2. USING THE INFORMATION IN VARIOUS FIELDS IN THE TAPE VOLUME  *
*         RECORD.                                                     *
*      3. PASSING INFORMATION TO CBRUXCUA USING THE LIBRARY           *
*         DESCRIPTION FIELD, AS SET BY THE ISMF LIBRARY MANAGEMENT    *
*         APPLICATION.                                                *
*      4. PASSING INFORMATION TO CBRUXCUA USING THE CBRXLCS           *
*         FUNC(CUA) PROGRAMMING INTERFACE.                            *
*                                                                    *
*    NOTES:                                                           *
*                                                                    *
*      DEPENDENCIES:        MVS/SP VERSION 4.3.0                      *
*                           DFSMS/MVS 1.1.0                           *
*                                                                    *
*      CHARACTER CODE:      EBCDIC                                    *
```

Figure 31. Sample Change Use Attribute Installation Exit—CBRSPUXC (Part 1 of 7)

```
*                                                              *
*      RESTRICTIONS:          NONE                             *
*                                                              *
*      REGISTER CONVENTIONS:                                   *
*        R0  - WORK REGISTER                                   *
*        R1  - STANDARD LINKAGE REGISTER                       *
*            - PARAMETER LIST ADDRESS                          *
*            - WORK REGISTER                                   *
*        R2  - NOT USED                                        *
*        R3  - NOT USED                                        *
*        R4  - NOT USED                                        *
*        R5  - NOT USED                                        *
*        R6  - NOT USED                                        *
*        R7  - NOT USED                                        *
*        R8  - CBRUXCUA WORKING STORAGE BASE REGISTER          *
*        R9  - RETURN CODE WORK REGISTER                       *
*        R10 - LIBRARY DESCRIPTION BASE REGISTER               *
*        R11 - UXCPL BASE REGISTER                             *
*        R12 - CBRUXCUA BASE REGISTER                          *
*        R13 - STANDARD LINKAGE REGISTER                       *
*            - SAVE AREA ADDRESS                               *
*        R14 - STANDARD LINKAGE REGISTER                       *
*            - RETURN POINT ADDRESS                            *
*            - WORK REGISTER                                   *
*        R15 - STANDARD LINKAGE REGISTER                       *
*            - ENTRY POINT ADDRESS                             *
*            - RETURN CODE                                     *
*            - WORK REGISTER                                   *
*                                                              *
*    MODULE TYPE:             CONTROL SECTION                  *
*                                                              *
*      PROCESSOR:             ASSEMBLER H                      *
*                                                              *
*      ATTRIBUTES:                                             *
*                                                              *
*        LOCATION:            JOB PACK AREA                    *
*        STATE:               SUPERVISOR                       *
*        AMODE:               31                               *
*        RMODE:               ANY                              *
*        KEY:                 CALLER'S                         *
*        MODE:                TASK                             *
*        SERIALIZATION:       UNLOCKED                         *
*        TYPE:                REUSABLE                         *
*                             REENTRANT                        *
*                             REFRESHABLE                      *
*        AUTHORIZATION:       APF AUTHORIZED                   *
*                                                              *
*      LINKAGE:               STANDARD LINKAGE CONVENTIONS     *
*                                                              *
*      CALLING SEQUENCE:                                       *
*        CBRUXCUA IS INVOKED USING THE MVS LINK MACRO.         *
```

Figure 31. Sample Change Use Attribute Installation Exit—CBRSPUXC (Part 2 of 7)

```
*                                                              *
*     INPUT:                                                   *
*       AT ENTRY TO CBRUXCUA, REGISTER 1 CONTAINS THE ADDRESS OF  *
*       THE CHANGE USE ATTRIBUTE INSTALLATION EXIT PARAMETER LIST.  *
*                                                              *
*     OUTPUT:                                                  *
*       A RETURN CODE IS PLACED IN REGISTER 15:                *
*         CODE  MEANING                                        *
*           0   CHANGE THE VOLUME USE ATTRIBUTE AS REQUESTED.  NO  *
*               CHANGES HAVE BEEN MADE TO THE TAPE VOLUME RECORD.  *
*           4   CHANGE THE VOLUME USE ATTRIBUTE AS REQUESTED.  ONE  *
*               OR MORE FIELDS IN THE TAPE VOLUME RECORD HAVE BEEN  *
*               CHANGED.                                       *
*           8   DO NOT ALLOW THE VOLUME USE ATTRIBUTE TO BE    *
*               CHANGED.                                       *
*          12   NOT USED.                                      *
*          16   DO NOT INVOKE THE CHANGE USE ATTRIBUTE INSTALLATION *
*               EXIT AGAIN.  ALLOW ALL REQUESTS TO CHANGE THE  *
*               VOLUME USE ATTRIBUTE.                          *
*                                                              *
*     EXIT NORMAL:                                             *
*       RETURN TO THE CALLER WITH ONE OF THE RETURN CODES DESCRIBED *
*       ABOVE.                                                 *
*                                                              *
*     EXIT ERROR:  NONE                                        *
*                                                              *
*   EXTERNAL REFERENCES:                                       *
*                                                              *
*     ROUTINES:  NONE                                          *
*                                                              *
*     CONTROL BLOCKS:                                          *
*       CBRUXCPL - CHANGE USE ATTRIBUTE INSTALLATION           *
*                  EXIT PARAMETER LIST              - R/W      *
*                                                              *
*   EXECUTABLE MACROS:                                         *
*     FREEMAIN                                                 *
*     GETMAIN                                                  *
*     RETURN                                                   *
*     SAVE                                                     *
*                                                              *
*   MESSAGES:  NONE                                            *
*                                                              *
*   ABEND CODES:  NONE                                         *
*                                                              *
*** END OF SPECIFICATIONS ***********************************
```

Figure 31. Sample Change Use Attribute Installation Exit—CBRSPUXC (Part 3 of 7)

```
          TITLE 'CBRUXCPL - CHANGE USE ATTRIBUTE INST EXIT PARAM LIST'
          CBRUXCPL ,                CHANGE USE ATTR INST EXIT PLIST
          TITLE 'STANDARD REGISTER DEFINITIONS'
*----------------------------------------------------------------------*
*                                                                      *
*          STANDARD REGISTER DEFINITIONS                               *
*                                                                      *
*----------------------------------------------------------------------*
R0        EQU   0                   GENERAL REGISTER 0
R1        EQU   1                   GENERAL REGISTER 1
R2        EQU   2                   GENERAL REGISTER 2
R3        EQU   3                   GENERAL REGISTER 3
R4        EQU   4                   GENERAL REGISTER 4
R5        EQU   5                   GENERAL REGISTER 5
R6        EQU   6                   GENERAL REGISTER 6
R7        EQU   7                   GENERAL REGISTER 7
R8        EQU   8                   GENERAL REGISTER 8
R9        EQU   9                   GENERAL REGISTER 9
R10       EQU   10                  GENERAL REGISTER 10
R11       EQU   11                  GENERAL REGISTER 11
R12       EQU   12                  GENERAL REGISTER 12
R13       EQU   13                  GENERAL REGISTER 13
R14       EQU   14                  GENERAL REGISTER 14
R15       EQU   15                  GENERAL REGISTER 15
          TITLE 'LIBRARY DESCRIPTION FIELD FORMAT'
*----------------------------------------------------------------------*
*                                                                      *
*          LIBRARY DESCRIPTION FIELD FORMAT                            *
*                                                                      *
*          NOTE:  THIS IS INTENDED AS AN EXAMPLE OF THE KIND OF        *
*                 INFORMATION THE INSTALLATION CAN PASS TO THE EXIT    *
*                 VIA THE LIBRARY DESCRIPTION FIELD, WHICH IS SET      *
*                 USING THE ISMF LIBRARY MANAGEMENT APPLICATION.       *
*----------------------------------------------------------------------*
LIBDESC   DSECT ,                   LIBRARY DESCRIPTION FIELD
LIBDDSGN  DS    CL8                 DEFAULT STORAGE GROUP NAME
          DS    CL1                 SEPARATOR
LIBDPRIV  DS    CL1                 ALLOW PREVIOUSLY UNKNOWN PRIVATE
*                                    VOLUME TO BE ENTERED
*                                    'Y' - ALLOW BOTH PRIVATE AND
*                                        SCRATCH VOLUMES TO BE
*                                        ENTERED
*                                    'N' - ALLOW ONLY SCRATCH
*                                        VOLUMES TO BE ENTERED
          DS    CL1                 SEPARATOR
LIBDRDCM  DS    CL1                 SET READ-COMPATIBLE ATTRIBUTE
*                                    FOR PREVIOUSLY UNKNOWN MEDIA1
*                                    PRIVATE VOLUME
*                                    'Y' - SET ATTRIBUTE
*                                    'N' - DO NOT SET ATTRIBUTE
          DS    CL1                 SEPARATOR
```

Figure 31. Sample Change Use Attribute Installation Exit—CBRSPUXC (Part 4 of 7)

```
LIBDAUTH DS    CL1                 AUTHORIZATION REQUIRED FOR
*                                   CARTRIDGE EJECT
*                                   'Y' - AUTHORIZATION REQUIRED
*                                   'N' - AUTH NOT REQUIRED
         DS    CL106               AVAILABLE
         TITLE 'CBRUXCUA WORKING STORAGE'
*-------------------------------------------------------------------*
*                                                                   *
*        CBRUXCUA WORKING STORAGE                                   *
*                                                                   *
*-------------------------------------------------------------------*
CUAWORK  DSECT ,                   CBRUXCUA WORKING STORAGE
SAVE     DS    18F                 CBRUXCUA SAVE AREA
         SPACE 2
WORKEND  DS    0D                  END OF CBRUXCUA WORKING STORAGE
WORKLEN  EQU   *-CUAWORK           CBRUXCUA WORKING STORAGE LENGTH
         TITLE 'CBRUXCUA - SAMPLE CHANGE USE ATTRIBUTE INST EXIT'
*-------------------------------------------------------------------*
*                                                                   *
*        CBRUXCUA ENTRY POINT                                       *
*                                                                   *
*-------------------------------------------------------------------*
CBRUXCUA CSECT ,                   SAMPLE CHANGE USE ATTR INST EXIT
CBRUXCUA AMODE 31
CBRUXCUA RMODE ANY
         SAVE  (14,12),,           SAVE CALLER'S REGISTERS AND
               'CBRUXCUA&SYSDATE'    MARK ENTRY POINT
         LR    R12,R15             COPY ENTRY POINT ADDRESS
         USING CBRUXCUA,R12        CBRUXCUA BASE REGISTER
         LR    R11,R1              COPY PARAMETER ADDRESS
         USING UXCPL,R11           CHANGE USE ATTR INST EXIT PARM LIST
         GETMAIN RU,               GETMAIN WORKING STORAGE FROM
               LV=WORKLEN,           SUBPOOL 230 TO GET PSW KEY
               SP=230                STORAGE
         LR    R8,R1               SAVE WORKING STORAGE ADDRESS
         USING CUAWORK,R8          CBRUXCUA WORKING STORAGE
         LR    R14,R1              START ADDRESS OF TARGET AREA
         LA    R15,WORKLEN         TARGET LENGTH
         LR    R0,R1               START ADDRESS OF SOURCE AREA
         SR    R1,R1               ZERO SOURCE LENGTH AND PAD BYTE
         MVCL  R14,R0              CLEAR WORKING STORAGE
         ST    R13,SAVE+4          BACKWARD CHAIN SAVE AREAS
         LA    R0,SAVE             CBRUXCUA SAVE AREA ADDRESS
         ST    R0,8(,R13)          FORWARD CHAIN SAVE AREAS
         LR    R13,R0              SET CBRUXCUA SAVE AREA ADDRESS
         LA    R10,UXCLDESC        ADDRESS OF LIBRARY DESCRIPTION
         USING LIBDESC,R10         LIBRARY DESCRIPTION FIELD
         EJECT ,
*-------------------------------------------------------------------*
*                                                                   *
*        PRESET RETURN CODE ZERO                                    *
*                                                                   *
*-------------------------------------------------------------------*
         LA    R9,UXCNOCHG         CHANGE USE ATTRIBUTE WITHOUT
*                                   CHANGING TAPE VOLUME RECORD
         SPACE 2
```

Figure 31. Sample Change Use Attribute Installation Exit—CBRSPUXC (Part 5 of 7)

```
         *------------------------------------------------------------------*
         *                                                                  *
         *      IF THE VOLUME USE ATTRIBUTE WILL NOT CHANGE, ALLOW THE      *
         *      FUNCTION TO CONTINUE.  THE INVOKER OF CUA IS PROBABLY ISMF  *
         *      VOLUME ALTER, AND THE PURPOSE IS TO ENSURE THAT THE USE     *
         *      ATTRIBUTE AND THE LIBRARY MANAGER CATEGORY MATCH.           *
         *                                                                  *
         *------------------------------------------------------------------*
               CLC   UXCCUSEA,UXCUSEA    OLD ATTRIBUTE = NEW ATTRIBUTE?
               BE    EXIT                YES. RETURN TO CALLER
               SPACE 2
         *------------------------------------------------------------------*
         *                                                                  *
         *      IF THE VOLUME IS SHELF-RESIDENT, DO NOT ALLOW THE VOLUME    *
         *      USE ATTRIBUTE TO BE CHANGED.                                *
         *                                                                  *
         *      SET THE REJECT RETURN CODE, AND EXIT.                       *
         *                                                                  *
         *------------------------------------------------------------------*
               CLC   UXCLIB,=CL8'SHELF'  SHELF-RESIDENT VOLUME?
               BNE   CUA2000             NO. CHECK CHANGE TO SCRATCH
               LA    R9,UXCFAIL          SET CHANGE USE ATTRIBUTE REQUEST
         *                                  DENIED RETURN CODE
               B     EXIT                RETURN TO CALLER
               EJECT ,
         *------------------------------------------------------------------*
         *                                                                  *
         *      IF THE USE ATTRIBUTE IS TO BE CHANGED TO SCRATCH, AND IF    *
         *      THE REQUEST IS FROM THE PROGRAMMED INTERFACE (USING THE     *
         *      CBRXLCS MACRO), ALLOW THE REQUEST.                          *
         *                                                                  *
         *------------------------------------------------------------------*
         CUA2000 DS    0H
               CLI   UXCUSEA,UXCSCRT     CHANGE TO SCRATCH?
               BNE   CUA3000             NO. CHECK STORAGE GROUP NAME
               CLC   UXCEXITI,PASSTHRU   EJECT AUTHORIZED BY PROGRAMMED
         *                                  INTERFACE?
               BE    EXIT                YES. RETURN TO CALLER
               SPACE 2
         *------------------------------------------------------------------*
         *                                                                  *
         *      THE REQUEST IS NOT FROM THE PROGRAMMED INTERFACE.  ALLOW    *
         *      THE CHANGE TO SCRATCH ONLY WHEN THE VOLUME IS NOT WRITE     *
         *      PROTECTED AND IS NOT A SECURE CHECKPOINT VOLUME.            *
         *                                                                  *
         *------------------------------------------------------------------*
               CLI   UXCWPROT,UXCYES     WRITE PROTECTED VOLUME?
               BE    CUA2100             YES. REJECT CUA REQUEST
               CLI   UXCCHKPT,UXCYES     SECURE CHECKPOINT VOLUME?
               BNE   EXIT                NO. RETURN TO CALLER
         CUA2100 DS    0H
               LA    R9,UXCFAIL          SET CHANGE USE ATTRIBUTE REQUEST
         *                                  DENIED RETURN CODE
               B     EXIT                RETURN TO CALLER
               EJECT ,
```

Figure 31. Sample Change Use Attribute Installation Exit—CBRSPUXC (Part 6 of 7)

```
*-------------------------------------------------------------------*
*                                                                   *
*        THE USE ATTRIBUTE IS TO BE CHANGED TO PRIVATE.             *
*                                                                   *
*        IF THE STORAGE GROUP NAME IS BLANK, SET THE DEFAULT STORAGE *
*        GROUP NAME FROM THE LIBRARY DESCRIPTION.                   *
*                                                                   *
*-------------------------------------------------------------------*
CUA3000 DS    0H
        CLC   UXCGROUP,=CL8' '    BLANK STORAGE GROUP NAME?
        BNE   EXIT                NO. RETURN TO CALLER
        LA    R9,UXCCHG           ALLOW CHANGE USE ATTRIBUTE WITH
*                                  TAPE VOLUME RECORD CHANGED
        MVC   UXCGROUP,LIBDDSGN   SET DEFAULT STORAGE GROUP NAME
        EJECT ,
*-------------------------------------------------------------------*
*                                                                   *
*        RETURN TO THE CALLER                                       *
*                                                                   *
*-------------------------------------------------------------------*
EXIT    DS    0H
        L     R13,SAVE+4          RESTORE CALLER'S SAVE AREA ADDRESS
        FREEMAIN  RU,             RELEASE WORKING STORAGE
            LV=WORKLEN,
            A=(R8),
            SP=230
        LR    R15,R9              SET RETURN CODE
        RETURN  (14,12),          RESTORE CALLER'S REGISTERS, THEN
            RC=(15)                RETURN TO CALLER
        TITLE 'CBRUXCUA CONSTANTS'
*-------------------------------------------------------------------*
*                                                                   *
*        CBRUXCUA CONSTANTS                                         *
*                                                                   *
*-------------------------------------------------------------------*
        LTORG ,                   LITERAL CONSTANTS
        SPACE 2
PASSTHRU DC   CL16'SIMP'          PASSTHRU VALUE TO AUTHORIZE CUA
        SPACE 2
        END   CBRUXCUA
```

Figure 31. Sample Change Use Attribute Installation Exit—CBRSPUXC (Part 7 of 7)

SAMPLIB Member CBRSPUXE

This SAMPLIB member is a sample cartridge entry installation exit.

```
UXENT    TITLE 'CBRUXENT - SAMPLE CARTRIDGE ENTRY INSTALLATION EXIT'
CBRUXENT START 0                      SAMPLE CARTRIDGE ENTRY INST EXIT
         SPACE 2
**** START OF SPECIFICATIONS ****************************************
*                                                                  *
*    MODULE NAME:       CBRUXENT                                    *
*                                                                  *
*    DESCRIPTIVE NAME:  SAMPLE CARTRIDGE ENTRY INSTALLATION EXIT   *
*                                                                  *
*    FUNCTION:                                                     *
*      MODULE CBRUXENT IS INVOKED EACH TIME A CARTRIDGE IS ENTERED *
*      INTO A TAPE LIBRARY.  CBRUXENT MAY REFUSE TO ALLOW THE      *
*      CARTRIDGE TO BE ENTERED, OR UPDATE CERTAIN FIELDS IN THE TAPE *
*      VOLUME RECORD, OR APPROVE THE CARTRIDGE ENTRY WITHOUT CHANGE, *
*      OR LEAVE THE CARTRIDGE FOR PROCESSING BY SOME OTHER SYSPLEX. *
*                                                                  *
*      CBRUXENT DEMONSTRATES THE USE OF THE FOLLOWING FUNCTIONS:   *
*      1. SETTING THE "IGNORE" RETURN CODE TO LEAVE AN ENTERED     *
*         VOLUME IN THE LIBRARY MANAGER INSERT CATEGORY SO THAT IT *
*         MAY BE PROCESSED FOR ENTRY BY ANOTHER SYSPLEX.           *
*      2. SETTING THE "REJECT" RETURN CODE TO PREVENT A VOLUME FROM *
*         BEING ENTERED INTO THE LIBRARY.                          *
*      3. USING THE SHELF LOCATION AND OWNER INFORMATION FIELDS IN *
*         THE TAPE VOLUME RECORD.                                  *
*      4. PASSING INFORMATION TO CBRUXENT USING THE LIBRARY        *
*         DESCRIPTION FIELD, AS SET BY THE ISMF LIBRARY MANAGEMENT *
*         APPLICATION.                                             *
*      5. SETTING THE READ-COMPATIBLE ATTRIBUTE, TO ALLOW A PRIVATE *
*         VOLUME RECORDED IN 18-TRACK MODE TO BE MOUNTED ON A      *
*         36-TRACK DRIVE FOR READ-ONLY USAGE.                      *
*                                                                  *
*    NOTES:                                                        *
*                                                                  *
*      DEPENDENCIES:        MVS/SP VERSION 4.3.0                   *
*                           DFSMS/MVS 1.1.0                        *
*                                                                  *
*      CHARACTER CODE:      EBCDIC                                 *
*                                                                  *
*      RESTRICTIONS:        NONE                                   *
```

Figure 32. Sample Cartridge Entry Installation Exit—CBRSPUXE (Part 1 of 8)

```
*                                                            *
*       REGISTER CONVENTIONS:                                *
*          R0  - WORK REGISTER                               *
*          R1  - STANDARD LINKAGE REGISTER                   *
*                - PARAMETER LIST ADDRESS                    *
*                - WORK REGISTER                             *
*          R2  - NOT USED                                    *
*          R3  - NOT USED                                    *
*          R4  - NOT USED                                    *
*          R5  - NOT USED                                    *
*          R6  - NOT USED                                    *
*          R7  - NOT USED                                    *
*          R8  - BASE REGISTER FOR WORKING STORAGE           *
*          R9  - RETURN CODE WORK REGISTER                   *
*          R10 - LIBRARY DESCRIPTION BASE REGISTER           *
*          R11 - UXEPL BASE REGISTER                         *
*          R12 - CBRUXENT BASE REGISTER                      *
*          R13 - STANDARD LINKAGE REGISTER                   *
*                - SAVE AREA ADDRESS                         *
*          R14 - STANDARD LINKAGE REGISTER                   *
*                - RETURN POINT ADDRESS                      *
*          R15 - STANDARD LINKAGE REGISTER                   *
*                - ENTRY POINT ADDRESS                       *
*                - RETURN CODE                               *
*                                                            *
*    MODULE TYPE:              CONTROL SECTION               *
*                                                            *
*      PROCESSOR:             ASSEMBLER H                    *
*                                                            *
*      ATTRIBUTES:                                           *
*                                                            *
*        LOCATION:            JOB PACK AREA                  *
*        STATE:               PROBLEM                        *
*        AMODE:               31  - MAY BE 24 IF NECESSARY   *
*        RMODE:               ANY - MAY BE 24 IF NECESSARY   *
*        KEY:                 5 (DATA MANAGEMENT)            *
*        MODE:                TASK                           *
*        SERIALIZATION:       UNLOCKED                       *
*        TYPE:                REUSABLE                       *
*                             REENTRANT                      *
*                             REFRESHABLE                    *
*        AUTHORIZATION:       APF AUTHORIZED                 *
*                                                            *
*      LINKAGE:               STANDARD LINKAGE CONVENTIONS   *
*                                                            *
*      CALLING SEQUENCE:                                     *
*        CBRUXENT IS INVOKED IN THE OAM ADDRESS SPACE USING THE MVS *
*        LINK MACRO.                                         *
```

Figure 32. Sample Cartridge Entry Installation Exit—CBRSPUXE (Part 2 of 8)

```
*                                                                    *
*      INPUT:                                                         *
*       AT ENTRY TO CBRUXENT, REGISTER 1 CONTAINS THE ADDRESS OF      *
*       THE CARTRIDGE ENTRY INSTALLATION EXIT PARAMETER LIST.         *
*                                                                    *
*      OUTPUT:                                                        *
*       A RETURN CODE IS PLACED IN REGISTER 15:                       *
*         CODE  MEANING                                               *
*          0    ENTER THE CARTRIDGE INTO THE LIBRARY.  THE TAPE       *
*               VOLUME RECORD IS UNCHANGED.                           *
*          4    ENTER THE CARTRIDGE INTO THE LIBRARY.  ONE OR MORE    *
*               FIELDS IN THE TAPE VOLUME RECORD HAVE BEEN CHANGED.   *
*          8    DO NOT ALLOW THE CARTRIDGE TO BE ENTERED INTO THE     *
*               LIBRARY.  EJECT THE CARTRIDGE IMMEDIATELY.            *
*         12    IGNORE THE REQUEST TO ENTER THE CARTRIDGE INTO THE    *
*               LIBRARY.  LEAVE THE CARTRIDGE IN THE INSERT           *
*               CATEGORY FOR PROCESSING BY ANOTHER SYSPLEX.           *
*         16    DO NOT INVOKE THE CARTRIDGE ENTRY INSTALLATION EXIT   *
*               AGAIN.  ALLOW ALL CARTRIDGES TO BE ENTERED WITHOUT    *
*               CHANGES TO THEIR TAPE VOLUME RECORDS.                 *
*                                                                    *
*      EXIT NORMAL:                                                   *
*       RETURN TO THE CALLER WITH ONE OF THE RETURN CODES DESCRIBED   *
*       ABOVE.                                                        *
*                                                                    *
*      EXIT ERROR:  NONE                                              *
*                                                                    *
*    EXTERNAL REFERENCES:                                             *
*                                                                    *
*      ROUTINES:  NONE                                               *
*                                                                    *
*      CONTROL BLOCKS:                                                *
*        CBRUXEPL - CARTRIDGE ENTRY INSTALLATION EXIT                 *
*                   PARAMETER LIST                        - R/W       *
*                                                                    *
*    EXECUTABLE MACROS:                                               *
*      RETURN                                                         *
*      SAVE                                                           *
*                                                                    *
*    MESSAGES:  NONE                                                 *
*                                                                    *
*    ABEND CODES:  NONE                                              *
*                                                                    *
**** END OF SPECIFICATIONS *******************************************
```

Figure 32. Sample Cartridge Entry Installation Exit—CBRSPUXE (Part 3 of 8)

```
              TITLE 'CBRUXEPL - CARTRIDGE ENTRY INST EXIT PARAMETER LIST'
              CBRUXEPL  ,               CART ENTRY INST EXIT PARM LIST
              TITLE 'STANDARD REGISTER DEFINITIONS'
*----------------------------------------------------------------------*
*                                                                      *
*          STANDARD REGISTER DEFINITIONS                               *
*                                                                      *
*----------------------------------------------------------------------*
R0       EQU   0                      GENERAL REGISTER 0
R1       EQU   1                      GENERAL REGISTER 1
R2       EQU   2                      GENERAL REGISTER 2
R3       EQU   3                      GENERAL REGISTER 3
R4       EQU   4                      GENERAL REGISTER 4
R5       EQU   5                      GENERAL REGISTER 5
R6       EQU   6                      GENERAL REGISTER 6
R7       EQU   7                      GENERAL REGISTER 7
R8       EQU   8                      GENERAL REGISTER 8
R9       EQU   9                      GENERAL REGISTER 9
R10      EQU   10                     GENERAL REGISTER 10
R11      EQU   11                     GENERAL REGISTER 11
R12      EQU   12                     GENERAL REGISTER 12
R13      EQU   13                     GENERAL REGISTER 13
R14      EQU   14                     GENERAL REGISTER 14
R15      EQU   15                     GENERAL REGISTER 15
           TITLE 'CBRUXENT WORKING STORAGE'
*----------------------------------------------------------------------*
*                                                                      *
*          CBRUXENT WORKING STORAGE                                    *
*                                                                      *
*----------------------------------------------------------------------*
ENTWORK  DSECT ,                      XXA
SAVE     DS    18F                    CBRUXENT SAVE AREA
WORKEND  DS    0D                     XXA
WORKLEN  EQU   *-ENTWORK              XXA
         SPACE 2
         TITLE 'LIBRARY DESCRIPTION FIELD FORMAT'
*----------------------------------------------------------------------*
*                                                                      *
*          LIBRARY DESCRIPTION FIELD FORMAT                            *
*                                                                      *
*          NOTE:  THIS IS INTENDED AS AN EXAMPLE OF THE KIND OF        *
*                 INFORMATION THE INSTALLATION CAN PASS TO THE EXIT    *
*                 VIA THE LIBRARY DESCRIPTION FIELD, WHICH IS SET      *
*                 USING THE ISMF LIBRARY MANAGEMENT APPLICATION.       *
*----------------------------------------------------------------------*
LIBDESC  DSECT ,                      LIBRARY DESCRIPTION FIELD
LIBDDSGN DS    CL8                    DEFAULT STORAGE GROUP NAME
         DS    CL1                    SEPARATOR
```

Figure 32. Sample Cartridge Entry Installation Exit—CBRSPUXE (Part 4 of 8)

```
LIBDPRIV DS     CL1                     ALLOW PREVIOUSLY UNKNOWN PRIVATE
*                                        VOLUME TO BE ENTERED
*                                        'Y' - ALLOW BOTH PRIVATE AND
*                                            SCRATCH VOLUMES TO BE
*                                            ENTERED
*                                        'N' - ALLOW ONLY SCRATCH
*                                            VOLUMES TO BE ENTERED
         DS     CL1                     SEPARATOR
LIBDRDCM DS     CL1                     SET READ-COMPATIBLE ATTRIBUTE
*                                        FOR PREVIOUSLY UNKNOWN MEDIA1
*                                        PRIVATE VOLUME
*                                        'Y' - SET ATTRIBUTE
*                                        'N' - DO NOT SET ATTRIBUTE
         DS     CL1                     SEPARATOR
LIBDAUTH DS     CL1                     AUTHORIZATION REQUIRED FOR
*                                        CARTRIDGE EJECT
*                                        'Y' - AUTHORIZATION REQUIRED
*                                        'N' - AUTH NOT REQUIRED
         DS     CL106                   AVAILABLE
         TITLE 'CBRUXENT - SAMPLE CARTRIDGE ENTRY INSTALLATION EXIT'
*--------------------------------------------------------------------*
*                                                                    *
*        CBRUXENT ENTRY POINT                                        *
*                                                                    *
*--------------------------------------------------------------------*
CBRUXENT CSECT ,                        SAMPLE CARTRIDGE ENTRY INST EXIT
CBRUXENT AMODE 31
CBRUXENT RMODE ANY
         SAVE  (14,12),,               SAVE CALLER'S REGISTERS AND     +
               'CBRUXENT&SYSDATE'        MARK ENTRY POINT
         LR    R12,R15                 COPY ENTRY POINT ADDRESS
         USING CBRUXENT,R12            CBRUXENT BASE REGISTER
         LR    R11,R1                  COPY PARAMETER ADDRESS
         USING UXEPL,R11               CHANGE USE ATTR INST EXIT PARM LIST
         GETMAIN  RU,                  GETMAIN WORKING STORAGE FROM    +
               LV=WORKLEN,               SUBPOOL 0 TO GET PSW KEY      +
               SP=0                      STORAGE
         LR    R8,R1                   SAVE WORKING STORAGE ADDRESS
         USING ENTWORK,R8              CBRUXENT WORKING STORAGE
         LR    R14,R1                  START ADDRESS OF TARGET AREA
         LA    R15,WORKLEN             TARGET LENGTH
         LR    R0,R1                   START ADDRESS OF SOURCE AREA
         SR    R1,R1                   ZERO SOURCE LENGTH & PAD BYTE
         MVCL  R14,R0                  CLEAR WORKING STORAGE
         ST    R13,SAVE+4              BACKWARD CHAIN SAVE AREAS
         LA    R0,SAVE                 CBRUXENT SAVE AREA ADDRESS
         ST    R0,8(,R13)              FORWARD CHAIN SAVE AREAS
         LR    R13,R0                  SET CBRUXENT SAVE AREA ADDRESS
         LA    R10,UXELDESC            ADDRESS OF LIBRARY DESCRIPTION
         USING LIBDESC,R10             LIBRARY DESCRIPTION FIELD
         SPACE 2
```

Figure 32. Sample Cartridge Entry Installation Exit—CBRSPUXE (Part 5 of 8)

```
      *-------------------------------------------------------------------*
      *                                                                   *
      *      PRESET RETURN CODE ZERO                                       *
      *                                                                   *
      *-------------------------------------------------------------------*
            LA    R9,UXENOCHG           ENTER CARTRIDGE WITHOUT CHANGING
      *                                   TAPE VOLUME RECORD
            EJECT ,
      *-------------------------------------------------------------------*
      *                                                                   *
      *      CHECK FOR A VOLUME WHICH BELONGS TO ANOTHER SYSPLEX          *
      *                                                                   *
      *-------------------------------------------------------------------*
            CLI   UXEVOLSR,C'0'     FIRST VOLSER CHARACTER NUMERIC?
            BL    ENT1000           NO. CHECK VOLSER PREV UNKNOWN
            LA    R9,UXEIGNOR       IGNORE CARTRIDGE ENTRY - LEAVE
      *                               VOLUME FOR ANOTHER SYSPLEX
            B     EXIT              RETURN TO CALLER
            EJECT ,
      *-------------------------------------------------------------------*
      *                                                                   *
      *      CHECK FOR A PREVIOUSLY UNKNOWN VOLUME.                       *
      *                                                                   *
      *      IF THE VOLUME USE ATTRIBUTE IS PRIVATE, ALLOW THE CARTRIDGE *
      *      TO BE ENTERED ONLY IF SPECIFICALLY AUTHORIZED IN THE        *
      *      LIBRARY DESCRIPTION.                                        *
      *                                                                   *
      *-------------------------------------------------------------------*
      ENT1000 DS    0H
            CLC   UXECREAT,=CL10' '   BLANK RECORD CREATION DATE?
            BNE   ENT2000             NO. RECORD ALREADY EXISTED
            LA    R9,UXECHG           ALLOW CARTRIDGE ENTRY WITH TAPE
      *                                 VOLUME RECORD CHANGED
            MVC   UXEOWNER,=CL64'TUCSON PROGRAMMING CENTER'  SET LOCALLY
      *                                 OWNED VOLUME
            CLI   UXEUSEA,UXESCRT     SCRATCH USE ATTRIBUTE?
            BE    EXIT                YES. RETURN TO CALLER
            CLI   LIBDPRIV,UXEYES     ALLOW PRIVATE VOLUME ENTRY?
            BE    ENT1100             YES. SET STORAGE GROUP NAME
            LA    R9,UXEFAIL          SET CARTRIDGE ENTRY REQUEST DENIED
      *                                 RETURN CODE
            B     EXIT                RETURN TO CALLER
            SPACE 2
      *-------------------------------------------------------------------*
      *                                                                   *
      *      A PREVIOUSLY UNKNOWN PRIVATE VOLUME IS BEING ENTERED.        *
      *                                                                   *
      *      SET THE STORAGE GROUP NAME AND THE READ-COMPATIBLE          *
      *      ATTRIBUTE USING INFORMATION FROM THE LIBRARY DESCRIPTION.    *
      *                                                                   *
      *-------------------------------------------------------------------*
```

Figure 32. Sample Cartridge Entry Installation Exit—CBRSPUXE (Part 6 of 8)

```
ENT1100  DS    0H
         MVC   UXEGROUP,LIBDDSGN   SET DEFAULT STORAGE GROUP NAME
         CLI   UXEMEDIA,UXEMED1    MEDIA TYPE MEDIA1?
         BNE   EXIT               NO. RETURN TO CALLER
         CLI   UXEREC,UXE18TRK    18-TRACK RECORDING TECHNOLOGY?
         BNE   EXIT               NO. RETURN TO CALLER
         CLI   LIBDRDCM,UXEYES    SET READ COMPATIBILITY FOR MEDIA1?
         BNE   EXIT               NO. RETURN TO CALLER
         MVI   UXESPEC,UXERDCOM   SET READ-COMPATIBLE ATTRIBUTE
         B     EXIT               RETURN TO CALLER
         EJECT ,
*-------------------------------------------------------------------*
*                                                                   *
*       THE TAPE VOLUME RECORD ALREADY EXISTS FOR THE CARTRIDGE     *
*       BEING ENTERED.                                              *
*                                                                   *
*       IF THE SHELF LOCATION INDICATES THAT THE VOLUME MUST RESIDE *
*       ON THE SHELF, OR THE VOLUME OWNER IS NOT CURRENT IN PAYING  *
*       LIBRARY RENT, THE CARTRIDGE DOES NOT BELONG IN THE LIBRARY. *
*                                                                   *
*       SET THE REJECT RETURN CODE, AND EXIT.                       *
*                                                                   *
*-------------------------------------------------------------------*
ENT2000  DS    0H
         CLC   UXESHLOC,=CL32'TO THINE OWN SHELF BE TRUE'  MUST VOLUME
*                                         REMAIN ON SHELF?
         BE    ENT2100            YES. SET REJECT RETURN CODE
         CLC   UXEOWNER,=CL64'JOHN Q. DEADBEAT'  HAS OWNER PAID BILL?
         BNE   ENT3000            YES. CHECK TAPE VOLUME REC CHANGES
ENT2100  DS    0H
         LA    R9,UXEFAIL         SET CARTRIDGE ENTRY REQUEST DENIED
*                                         RETURN CODE
         B     EXIT               RETURN TO CALLER
         EJECT ,
*-------------------------------------------------------------------*
*                                                                   *
*       IF THE VOLUME USE ATTRIBUTE IS PRIVATE, THE MEDIA TYPE IS   *
*       MEDIA1 (CARTRIDGE SYSTEM TAPE), AND THE TAPE RECORDING      *
*       TECHNOLOGY IS 18-TRACK, THE VOLUME IS INTENDED FOR USE IN   *
*       READ-ONLY MODE.  SET THE READ-COMPATIBLE SPECIAL ATTRIBUTE. *
*                                                                   *
*-------------------------------------------------------------------*
ENT3000  DS    0H
         CLI   UXEUSEA,UXEPRIV    PRIVATE USE ATTRIBUTE?
         BNE   EXIT               NO. RETURN TO CALLER
         CLI   UXEMEDIA,UXEMED1   MEDIA TYPE MEDIA1?
         BNE   EXIT               NO. RETURN TO CALLER
         CLI   UXEREC,UXE18TRK    18-TRACK RECORDING TECHNOLOGY?
         BNE   EXIT               NO. RETURN TO CALLER
         LA    R9,UXECHG          ALLOW CARTRIDGE ENTRY WITH TAPE
*                                         VOLUME RECORD CHANGED
         MVI   UXESPEC,UXERDCOM   SET READ-COMPATIBLE ATTRIBUTE
         EJECT ,
```

Figure 32. Sample Cartridge Entry Installation Exit—CBRSPUXE (Part 7 of 8)

```
         *-------------------------------------------------------------------*
         *                                                                   *
         *         RETURN TO THE CALLER                                       *
         *                                                                   *
         *-------------------------------------------------------------------*
         EXIT    DS    0H
                 L     R13,SAVE+4             RESTORE CALLER'S SAVE AREA ADDRESS
                 FREEMAIN RU,                                                  +
                       LV=WORKLEN,                                             +
                       A=(R8),                                                 +
                       SP=0
                 LR    R15,R9                 SET RETURN CODE
                 RETURN (14,12),              RESTORE CALLER'S REGISTERS, THEN
                       RC=(15)                   RETURN TO CALLER
                 SPACE 2
                 END   CBRUXENT
```

Figure 32. Sample Cartridge Entry Installation Exit—CBRSPUXE (Part 8 of 8)

SAMPLIB Member CBRSPUXJ

This SAMPLIB member is a sample cartridge eject installation exit.

```
UXEJC   TITLE 'CBRUXEJC - SAMPLE CARTRIDGE EJECT INSTALLATION EXIT'
CBRUXEJC START 0                      SAMPLE CARTRIDGE EJECT INST EXIT
        SPACE 2
**** START OF SPECIFICATIONS *****************************************
*                                                                   *
*    MODULE NAME:       CBRUXEJC                                     *
*                                                                   *
*    DESCRIPTIVE NAME:  SAMPLE CARTRIDGE EJECT INSTALLATION EXIT     *
*                                                                   *
*    FUNCTION:                                                       *
*      MODULE CBRUXEJC IS INVOKED EACH TIME A REQUEST IS MADE TO     *
*      EJECT A CARTRIDGE FROM A TAPE LIBRARY.  CBRUXEJC MAY REFUSE   *
*      TO ALLOW THE CARTRIDGE TO BE EJECTED, OR UPDATE CERTAIN       *
*      FIELDS IN THE TAPE VOLUME RECORD, OR APPROVE THE CARTRIDGE    *
*      EJECT WITHOUT CHANGE.                                         *
*                                                                   *
*      CBRUXEJC DEMONSTRATES THE USE OF THE FOLLOWING FUNCTIONS:     *
*      1. SETTING THE "REJECT" RETURN CODE TO PREVENT A VOLUME FROM  *
*         BEING EJECTED FROM THE LIBRARY.                            *
*      2. USING THE SHELF LOCATION AND OWNER INFORMATION FIELDS IN   *
*         THE TAPE VOLUME RECORD.                                    *
*      3. PASSING INFORMATION TO CBRUXEJC USING THE LIBRARY          *
*         DESCRIPTION FIELD, AS SET BY THE ISMF LIBRARY MANAGEMENT   *
*         APPLICATION.                                               *
```

Figure 33. Sample Cartridge Eject Installation Exit—CBRSPUXJ (Part 1 of 9)

```
*        4. PASSING INFORMATION TO CBRUXEJC USING THE CBRXLCS        *
*           FUNC(EJECT) PROGRAMMING INTERFACE.                       *
*        5. CHANGING THE VOLUME USE ATTRIBUTE AND THE TAPE VOLUME    *
*           RECORD DISPOSITION.                                      *
*                                                                   *
*     NOTES:                                                         *
*                                                                   *
*        DEPENDENCIES:           MVS/SP VERSION 4.3.0                *
*                                DFSMS/MVS 1.1.0                     *
*                                                                   *
*        CHARACTER CODE:         EBCDIC                              *
*                                                                   *
*        RESTRICTIONS:           NONE                               *
*                                                                   *
*        REGISTER CONVENTIONS:                                       *
*         R0  - WORK REGISTER                                        *
*         R1  - STANDARD LINKAGE REGISTER                            *
*             - PARAMETER LIST ADDRESS                               *
*             - WORK REGISTER                                        *
*         R2  - NOT USED                                             *
*         R3  - NOT USED                                             *
*         R4  - NOT USED                                             *
*         R5  - NOT USED                                             *
*         R6  - NOT USED                                             *
*         R7  - NOT USED                                             *
*         R8  - BASE REGISTER FOR WORKING STORAGE                    *
*         R9  - RETURN CODE WORK REGISTER                            *
*         R10 - LIBRARY DESCRIPTION BASE REGISTER                    *
*         R11 - UXJPL BASE REGISTER                                  *
*         R12 - CBRUXEJC BASE REGISTER                               *
*         R13 - STANDARD LINKAGE REGISTER                            *
*             - SAVE AREA ADDRESS                                    *
*         R14 - STANDARD LINKAGE REGISTER                            *
*             - RETURN POINT ADDRESS                                 *
*         R15 - STANDARD LINKAGE REGISTER                            *
*             - ENTRY POINT ADDRESS                                  *
*             - RETURN CODE                                          *
*                                                                   *
*     MODULE TYPE:               CONTROL SECTION                     *
*                                                                   *
*       PROCESSOR:               ASSEMBLER H                         *
*                                                                   *
*       ATTRIBUTES:                                                  *
*                                                                   *
*         LOCATION:              JOB PACK AREA                       *
*         STATE:                 PROBLEM                             *
*         AMODE:                 31  - MAY BE 24 IF NECESSARY        *
*         RMODE:                 ANY - MAY BE 24 IF NECESSARY        *
*         KEY:                   5 (DATA MANAGEMENT)                 *
*         MODE:                  TASK                                *
```

Figure 33. Sample Cartridge Eject Installation Exit—CBRSPUXJ (Part 2 of 9)

```
*         SERIALIZATION:      UNLOCKED                              *
*         TYPE:               REUSABLE                              *
*                             REENTRANT                             *
*                             REFRESHABLE                           *
*         AUTHORIZATION:      APF AUTHORIZED                        *
*                                                                   *
*      LINKAGE:               STANDARD LINKAGE CONVENTIONS          *
*                                                                   *
*      CALLING SEQUENCE:                                            *
*        CBRUXEJC IS INVOKED IN THE OAM ADDRESS SPACE USING THE MVS *
*        LINK MACRO.                                                *
*                                                                   *
*      INPUT:                                                       *
*        AT ENTRY TO CBRUXEJC, REGISTER 1 CONTAINS THE ADDRESS OF   *
*        THE CARTRIDGE EJECT INSTALLATION EXIT PARAMETER LIST.      *
*                                                                   *
*      OUTPUT:                                                      *
*        A RETURN CODE IS PLACED IN REGISTER 15:                    *
*          CODE  MEANING                                            *
*            0   EJECT THE CARTRIDGE FROM THE LIBRARY.  THE TAPE    *
*                VOLUME RECORD IS UNCHANGED.                        *
*            4   EJECT THE CARTRIDGE FROM THE LIBRARY.  ONE OR MORE *
*                FIELDS IN THE TAPE VOLUME RECORD HAVE BEEN CHANGED. *
*            8   DO NOT ALLOW THE CARTRIDGE TO BE EJECTED FROM THE  *
*                LIBRARY.                                           *
*           12   NOT USED.                                          *
*           16   DO NOT INVOKE THE CARTRIDGE EJECT INSTALLATION EXIT *
*                AGAIN.  ALLOW ALL CARTRIDGES TO BE EJECTED WITHOUT *
*                CHANGES TO THEIR TAPE VOLUME RECORDS.              *
*                                                                   *
*      EXIT NORMAL:                                                 *
*        RETURN TO THE CALLER WITH ONE OF THE RETURN CODES DESCRIBED *
*        ABOVE.                                                     *
*                                                                   *
*      EXIT ERROR:  NONE                                            *
*                                                                   *
*    EXTERNAL REFERENCES:                                           *
*                                                                   *
*      ROUTINES:  NONE                                              *
*                                                                   *
*      CONTROL BLOCKS:                                              *
*        CBRUXJPL - CARTRIDGE EJECT INSTALLATION EXIT               *
*                   PARAMETER LIST                      - R/W       *
*                                                                   *
*    EXECUTABLE MACROS:                                             *
*      RETURN                                                       *
*      SAVE                                                         *
*      TIME                                                         *
*                                                                   *
```

Figure 33. Sample Cartridge Eject Installation Exit—CBRSPUXJ (Part 3 of 9)

```
*    MESSAGES:  NONE                                                      *
*                                                                         *
*    ABEND CODES:  NONE                                                   *
*                                                                         *
**** END OF SPECIFICATIONS ************************************************
        TITLE 'CBRUXJPL - CARTRIDGE EJECT INST EXIT PARAMETER LIST'
        CBRUXJPL  ,                 CART EJECT INST EXIT PARM LIST
        TITLE 'STANDARD REGISTER DEFINITIONS'
*-----------------------------------------------------------------------*
*                                                                         *
*        STANDARD REGISTER DEFINITIONS                                   *
*                                                                         *
*-----------------------------------------------------------------------*
R0      EQU   0                     GENERAL REGISTER 0
R1      EQU   1                     GENERAL REGISTER 1
R2      EQU   2                     GENERAL REGISTER 2
R3      EQU   3                     GENERAL REGISTER 3
R4      EQU   4                     GENERAL REGISTER 4
R5      EQU   5                     GENERAL REGISTER 5
R6      EQU   6                     GENERAL REGISTER 6
R7      EQU   7                     GENERAL REGISTER 7
R8      EQU   8                     GENERAL REGISTER 8
R9      EQU   9                     GENERAL REGISTER 9
R10     EQU   10                    GENERAL REGISTER 10
R11     EQU   11                    GENERAL REGISTER 11
R12     EQU   12                    GENERAL REGISTER 12
R13     EQU   13                    GENERAL REGISTER 13
R14     EQU   14                    GENERAL REGISTER 14
R15     EQU   15                    GENERAL REGISTER 15
        TITLE 'CBRUXEJC WORKING STORAGE'
*-----------------------------------------------------------------------*
*                                                                         *
*     CBRUXEJC WORKING STORAGE                                           *
*                                                                         *
*-----------------------------------------------------------------------*
EJCWORK  DSECT ,
SAVE     DS    18F
         SPACE 2
TIMEDATE DS    0XL16                TIME MACRO RETURN AREA
         DS    XL8                  CURRENT TIME - UNUSED
DATE     DS    XL4                  CURRENT DATE - YYYYMMDD
         DS    XL4                  UNUSED
         SPACE 2
UNPKDATE DS    XL9                  CURRENT DATE IN UNPACKED FORMAT
         SPACE 2
ISODATE  DS    0CL10                CURRENT DATE IN ISO FORMAT
ISOYEAR  DS    CL4                  YEAR
         DC    C'-'                 HYPHEN
```

Figure 33. Sample Cartridge Eject Installation Exit—CBRSPUXJ (Part 4 of 9)

```
ISOMONTH DS    CL2                   MONTH
         DC    C'-'                  HYPHEN
ISODAY   DS    CLS                   DAY
WORKEND  DS    0D
WORKLEN  EQU   *-EJCWORK
               SPACE 2
         TITLE 'LIBRARY DESCRIPTION FIELD FORMAT'
*-------------------------------------------------------------------*
*                                                                   *
*        LIBRARY DESCRIPTION FIELD FORMAT                           *
*                                                                   *
*        NOTE:  THIS IS INTENDED AS AN EXAMPLE OF THE KIND OF       *
*               INFORMATION THE INSTALLATION CAN PASS TO THE EXIT   *
*               VIA THE LIBRARY DESCRIPTION FIELD, WHICH IS SET     *
*               USING THE ISMF LIBRARY MANAGEMENT APPLICATION.      *
*-------------------------------------------------------------------*
LIBDESC  DSECT ,                     LIBRARY DESCRIPTION FIELD
LIBDDSGN DS    CL8                   DEFAULT STORAGE GROUP NAME
         DS    CL1                   SEPARATOR
LIBDPRIV DS    CL1                   ALLOW PREVIOUSLY UNKNOWN PRIVATE
*                                      VOLUME TO BE ENTERED
*                                       'Y' - ALLOW BOTH PRIVATE AND
*                                             SCRATCH VOLUMES TO BE
*                                             ENTERED
*                                       'N' - ALLOW ONLY SCRATCH
*                                             VOLUMES TO BE ENTERED
         DS    CL1                   SEPARATOR
LIBDRDCM DS    CL1                   SET READ-COMPATIBLE ATTRIBUTE
*                                      FOR PREVIOUSLY UNKNOWN MEDIA1
*                                      PRIVATE VOLUME
*                                       'Y' - SET ATTRIBUTE
*                                       'N' - DO NOT SET ATTRIBUTE
         DS    CL1                   SEPARATOR
LIBDAUTH DS    CL1                   AUTHORIZATION REQUIRED FOR
*                                      CARTRIDGE EJECT
*                                       'Y' - AUTHORIZATION REQUIRED
*                                       'N' - AUTH NOT REQUIRED
         DS    CL106                 AVAILABLE
         TITLE 'CBRUXEJC - SAMPLE CARTRIDGE EJECT INSTALLATION EXIT'
*-------------------------------------------------------------------*
*                                                                   *
*        CBRUXEJC ENTRY POINT                                       *
*                                                                   *
*-------------------------------------------------------------------*
CBRUXEJC CSECT ,                     SAMPLE CARTRIDGE EJECT INST EXIT
CBRUXEJC AMODE 31
CBRUXEJC RMODE ANY
         SAVE  (14,12),,             SAVE CALLER'S REGISTERS AND
               'CBRUXEJC&SYSDATE'     MARK ENTRY POINT
         LR    R12,R15               COPY ENTRY POINT ADDRESS
         USING CBRUXEJC,R12          CBRUXEJC BASE REGISTER
         LR    R11,R1                COPY PARAMETER ADDRESS
         USING UXJPL,R11             CART EJECT INST EXIT PARM LIST
```

Figure 33. Sample Cartridge Eject Installation Exit—CBRSPUXJ (Part 5 of 9)

```
              GETMAIN  RU,                 GETMAIN WORKING STORAGE FROM
                     LV=WORKLEN,             SUBPOOL 0 TO GET PSW KEY
                     SP=0                    STORAGE
              LR    R8,R1                 SAVE WORKING STORAGE ADDRESS
              USING EJCWORK,R8            CBRUXEJC WORKING STORAGE
              LR    R14,R1                START ADDRESS OF TARGET AREA
              LA    R15,WORKLEN           TARGET LENGTH
              LR    R0,R1                 START ADDRESS OF SOURCE AREA
              SR    R1,R1                 ZERO SOURCE LENGTH & PAD BYTE
              MVCL  R14,R0                CLEAR WORKING STORAGE
              ST    R13,SAVE+4            BACKWARD CHAIN SAVE AREAS
              LA    R0,SAVE               CBRUXEJC SAVE AREA ADDRESS
              ST    R0,8(,R13)            FORWARD CHAIN SAVE AREAS
              LR    R13,R0                SET CBRUXEJC SAVE AREA ADDRESS
              LA    R10,UXJLDESC          ADDRESS OF LIBRARY DESCRIPTION
              USING LIBDESC,R10           LIBRARY DESCRIPTION FIELD
              SPACE 2
       *-------------------------------------------------------------------*
       *                                                                   *
       *      PRESET RETURN CODE ZERO                                      *
       *                                                                   *
       *-------------------------------------------------------------------*
              LA    R9,UXJNOCHG           EJECT CARTRIDGE WITHOUT CHANGING
       *                                   TAPE VOLUME RECORD
              EJECT ,
       *-------------------------------------------------------------------*
       *                                                                   *
       *      IF THE VOLUME OWNER IS ENTITLED TO LEAVE VOLUMES IN THE      *
       *      LIBRARY ON A PERMANENT BASIS, OR THE SHELF LOCATION SHOWS    *
       *      PERMANENT LIBRARY RESIDENCE, DO NOT ALLOW THE CARTRIDGE TO   *
       *      BE EJECTED.                                                  *
       *                                                                   *
       *      SET THE REJECT RETURN CODE, AND EXIT.                        *
       *                                                                   *
       *-------------------------------------------------------------------*
              CLC   UXJOWNER,=CL64'CONAN THE LIBRARIAN'  PRIVILEGED OWNER?
              BE    EJC1100               YES. SET REJECT RETURN CODE
              CLC   UXJSHLOC,=CL32'UNSHELFISH'  MUST VOLUME REMAIN IN
       *                                   LIBRARY?
              BNE   EJC2000               NO. CHECK AUTHORIZATION REQUIRED
       EJC1100 DS    0H
              LA    R9,UXJFAIL            SET CARTRIDGE EJECT REQUEST DENIED
       *                                   RETURN CODE
              B     EXIT                  RETURN TO CALLER
              EJECT ,
```

Figure 33. Sample Cartridge Eject Installation Exit—CBRSPUXJ (Part 6 of 9)

```
*-------------------------------------------------------------------*
*                                                                   *
*       CHECK FOR EJECT AUTHORIZATION REQUIRED.                      *
*                                                                   *
*       USING INFORMATION FROM THE LIBRARY DESCRIPTION, DETERMINE    *
*       WHETHER THE EJECT REQUEST REQUIRES AUTHORIZATION VIA THE     *
*       PROGRAMMED INTERFACE PASS-THROUGH VALUE.                     *
*                                                                   *
*-------------------------------------------------------------------*
EJC2000  DS    0H
         CLI   LIBDAUTH,UXJYES     AUTHORIZATION REQUIRED?
         BNE   EJC3000             NO. CHECK VOLUME USE ATTRIBUTE
         CLC   UXJEXITI,PASSTHRU   EJECT AUTHORIZED BY PROGRAMMED
*                                    INTERFACE?
         BE    EJC3000             YES. CHECK VOLUME USE ATTRIBUTE
         LA    R9,UXJFAIL          SET CARTRIDGE EJECT REQUEST DENIED
*                                    RETURN CODE
         B     EXIT                RETURN TO CALLER
         EJECT ,
*-------------------------------------------------------------------*
*                                                                   *
*       CARTRIDGE EJECTION IS ALLOWED.                               *
*                                                                   *
*       FOR A PRIVATE VOLUME, DETERMINE WHETHER THE VOLUME           *
*       EXPIRATION DATE HAS PASSED.                                  *
*                                                                   *
*-------------------------------------------------------------------*
EJC3000  DS    0H
         CLI   UXJUSEA,UXJPRIV     PRIVATE USE ATTRIBUTE?
         BNE   EJC4000             NO. PURGE TAPE VOLUME RECORD
         TIME  DEC,                GET CURRENT TIME AND DATE
               TIMEDATE,
               DATETYPE=YYYYMMDD,
               LINKAGE=SYSTEM
         UNPK  UNPKDATE,DATE(L'DATE+1)  GET DATE IN UNPACKED FORMAT
         MVC   ISOYEAR,UNPKDATE    SET YEAR
         MVC   ISOMONTH,UNPKDATE+4 SET MONTH
         MVC   ISODAY,UNPKDATE+6   SET DAY
         CLC   UXJEXPIR,ISODATE    HAS EXPIRATION DATE PASSED?
         BL    EJC4000             YES. PURGE TAPE VOLUME RECORD
         EJECT ,
*-------------------------------------------------------------------*
*                                                                   *
*       A PRIVATE VOLUME IS TO BE EJECTED.                           *
*                                                                   *
*       MAKE SURE THAT THE TAPE VOLUME RECORD IS KEPT.               *
*                                                                   *
*-------------------------------------------------------------------*
```

Figure 33. Sample Cartridge Eject Installation Exit—CBRSPUXJ (Part 7 of 9)

```
        CLI   UXJVDISP,UXJKEEP      RECORD DISPOSITION KEEP?
        BE    EJC5000               YES. CHECK SHELF LOCATION SUPPLIED
        LA    R9,UXJCHG             ALLOW CARTRIDGE EJECT WITH TAPE
*                                   VOLUME RECORD CHANGED
        MVI   UXJVDISP,UXJKEEP      MAKE SURE VOLUME RECORD IS KEPT
        B     EJC5000               CHECK SHELF LOCATION SUPPLIED
        SPACE 2
*-------------------------------------------------------------------*
*                                                                   *
*       EITHER AN EXPIRED PRIVATE VOLUME OR A SCRATCH VOLUME IS TO   *
*       BE EJECTED.                                                  *
*                                                                   *
*       MAKE SURE THAT THE TAPE VOLUME RECORD IS PURGED AFTER THE    *
*       CARTRIDGE HAS BEEN EJECTED.  NOTE THAT THE "TAPE VOLUME      *
*       RECORD CHANGED" RETURN CODE MUST BE SET IF THE CURRENT       *
*       DISPOSITION IS KEEP.                                         *
*                                                                   *
*-------------------------------------------------------------------*
EJC4000 DS    0H
        CLI   UXJVDISP,UXJPURGE     RECORD DISPOSITION PURGE?
        BE    EJC5000               YES. CHECK SHELF LOCATION SUPPLIED
        LA    R9,UXJCHG             ALLOW CARTRIDGE EJECT WITH TAPE
*                                   VOLUME RECORD CHANGED
        MVI   UXJVDISP,UXJPURGE     MAKE SURE VOLUME RECORD IS PURGED
        EJECT ,
*-------------------------------------------------------------------*
*                                                                   *
*       IF THE SHELF LOCATION IS BLANK, THE OPERATOR DID NOT SUPPLY  *
*       ONE IN RESPONSE TO MESSAGE CBR2601A.  SET A STANDARD SHELF   *
*       LOCATION VALUE.                                              *
*                                                                   *
*-------------------------------------------------------------------*
EJC5000 DS    0H
        CLC   UXJSHLOC,=CL32' '     SHELF LOCATION KNOWN?
        BNE   EXIT                  YES. RETURN TO CALLER
        LA    R9,UXJCHG             ALLOW CARTRIDGE EJECT WITH TAPE
*                                   VOLUME RECORD CHANGED
        CLI   UXJUSEA,UXJPRIV       PRIVATE VOLUME?
        BE    EJC5100               YES. SET PRIVATE SHELF LOCATION
        MVC   UXJSHLOC,=CL32'SCRATCH STORAGE RACK'  SET SCRATCH
*                                   SHELF LOCATION
        B     EXIT                  RETURN TO CALLER
EJC5100 DS    0H
        MVC   UXJSHLOC,=CL32'PRIVATE STORAGE ROOM'  SET PRIVATE
*                                   SHELF LOCATION
        EJECT ,
*-------------------------------------------------------------------*
*                                                                   *
*       RETURN TO THE CALLER                                         *
*                                                                   *
*-------------------------------------------------------------------*
```

Figure 33. Sample Cartridge Eject Installation Exit—CBRSPUXJ (Part 8 of 9)

```
EXIT     DS    0H
         L     R13,SAVE+4           RESTORE CALLER'S SAVE AREA ADDRESS
               FREEMAIN RU,
               LV=WORKLEN,
               A=(R8),
               SP=0
         LR    R15,R9               SET RETURN CODE
         RETURN (14,12),            RESTORE CALLER'S REGISTERS, THEN
               RC=(15)                  RETURN TO CALLER
         TITLE 'CONSTANTS AND WORK AREAS'
*-------------------------------------------------------------------*
*                                                                   *
*        CBRUXEJC CONSTANTS                                         *
*                                                                   *
*-------------------------------------------------------------------*
         LTORG ,                    LITERAL CONSTANTS
         SPACE 2
PASSTHRU DC    CL16'SIMP'           PASSTHRU VALUE TO AUTHORIZE EJECT
         SPACE 2
          END  CBRUXEJC
```

Figure 33. Sample Cartridge Eject Installation Exit—CBRSPUXJ (Part 9 of 9)

SAMPLIB Member CBRSPUXV

This SAMPLIB member is a sample volume not in library installation exit.

```
UXVNL    TITLE 'CBRUXVNL - VOLUME NOT IN LIBRARY INSTALLATION EXIT'
CBRUXVNL START 0                    VOLUME NOT IN LIBRARY INST EXIT
         SPACE 2
**** START OF SPECIFICATIONS ****************************************
*                                                                   *
*    MODULE NAME:      CBRUXVNL                                     *
*                                                                   *
*    DESCRIPTIVE NAME: SAMPLE VOLUME NOT IN LIBRARY INSTALLATION    *
*                      EXIT                                         *
*                                                                   *
*******************************************************************
*                                                                   *
*     THIS SAMPLE INSTALLATION EXIT MAY BE USED TO PROVIDE VOLUME   *
*     NOT IN LIBRARY RECOVERY WHILE THE CUSTOMER IS DEVELOPING AN   *
*     EXIT WHICH IS MORE CLOSELY TAILORED TO INSTALLATION NEEDS.    *
*                                                                   *
*     A DEFAULT VERSION OF CBRUXVNL IS DISTRIBUTED AS PART OF       *
*     DFSMSrmm.                                                     *
*                                                                   *
*******************************************************************
*                                                                   *
```

Figure 34. Sample Volume Not in Library Installation Exit—CBRSPUXV (Part 1 of 13)

```
*    FUNCTION:                                                    *
*      MODULE CBRUXVNL IS INVOKED TO ALLOW THE INSTALLATION TO    *
*      ENTER A TAPE VOLUME INTO A LIBRARY DURING PROCESSING FOR   *
*      THE JOB STEP WHICH REQUIRES THE VOLUME.                    *
*                                                                 *
*      THE EXIT IS ENTERED AT THE FOLLOWING TIMES:                *
*                                                                 *
*        1. JOB STEP SETUP PROCESSING                             *
*                                                                 *
*           THE DEVICE AND VOLUME REQUIREMENTS FOR THE JOB STEP ARE *
*           BEING DETERMINED.                                     *
*                                                                 *
*           THE VOLUME MAY HAVE ONE OF THREE STATES:              *
*             A. THE VOLUME IS KNOWN TO BE SHELF-RESIDENT.  THERE IS *
*                A TAPE VOLUME RECORD FOR THE VOLUME IN THE TAPE  *
*                CONFIGURATION DATA BASE.                         *
*             B. THE VOLUME IS KNOWN TO BE AN EXPORTED LOGICAL    *
*                VOLUME. THERE IS A TAPE VOLUME RECORD IN THE     *
*                TAPE CONFIGURATION DATABASE WITH STACKED=VOLSER  *
*                IN THE SHELF LOCATION FIELD.                     *
*             C. THE VOLUME IS UNKNOWN TO THE SYSTEM.  THERE IS NO *
*                TAPE VOLUME RECORD FOR THE VOLUME IN THE TCDB, THE *
*                VOLUME IS NOT A CURRENTLY MOUNTED DASD VOLUME, AND *
*                THE VOLUME IS NOT AN SMS-MANAGED DASD VOLUME.    *
*                                                                 *
*           IF THE EXIT CAUSES THE VOLUME TO BE ENTERED INTO A TAPE *
*           LIBRARY:                                              *
*             A. FOR AN EXISTING DATASET, THE REQUEST WILL BE     *
*                SMS-MANAGED MOUNTABLE, AND A LIBRARY-RESIDENT TAPE *
*                DRIVE WILL BE ALLOCATED.                         *
*             B. FOR A NEW DATASET, THE LIBRARY NAME IS PASSED TO *
*                THE ACS FILTER ROUTINES:                         *
*                1. IF THE FILTER ROUTINES DO NOT MAKE THE REQUEST *
*                   SMS-MANAGED MOUNTABLE, A NON-LIBRARY-RESIDENT *
*                   TAPE DRIVE IS ALLOCATED.  WHEN A MOUNT REQUEST *
*                   IS LATER ISSUED, THE VOLUME WILL HAVE TO BE   *
*                   EJECTED FROM THE LIBRARY BEFORE IT CAN BE     *
*                   MOUNTED ON THE DRIVE.                         *
*                2. IF THE FILTER ROUTINES MAKE THE REQUEST       *
*                   SMS-MANAGED MOUNTABLE, AND THE LIBRARY INTO   *
*                   WHICH THE VOLUME WAS ENTERED IS NOT INCLUDED IN *
*                   ANY OF THE SELECTED TAPE STORAGE GROUPS, SMS  *
*                   FAILS THE JOB.                                *
*                3. IF THE FILTER ROUTINES MAKE THE REQUEST       *
*                   SMS-MANAGED MOUNTABLE, AND THE LIBRARY INTO   *
*                   WHICH THE VOLUME WAS ENTERED IS INCLUDED IN ONE *
*                   OF THE SELECTED TAPE STORAGE GROUPS, A LIBRARY- *
*                   RESIDENT TAPE DRIVE WILL BE ALLOCATED.        *
```

Figure 34. Sample Volume Not in Library Installation Exit—CBRSPUXV (Part 2 of 13)

```
*                                                              *
*           IF THE EXIT TAKES NO ACTION:                       *
*              A. FOR AN EXISTING DATASET, THE REQUEST WILL BE *
*                 NON-SMS-MANAGED, AND A NON-LIBRARY-RESIDENT TAPE *
*                 DRIVE WILL ULTIMATELY BE ALLOCATED.          *
*              B. FOR A NEW DATASET, A NULL LIBRARY NAME IS PASSED TO *
*                 THE ACS FILTER ROUTINES:                     *
*                 1. IF THE FILTER ROUTINES MAKE THE REQUEST SMS- *
*                    MANAGED MOUNTABLE, SMS FAILS THE JOB.     *
*                 2. IF THE FILTER ROUTINES DO NOT MAKE THE REQUEST *
*                    SMS-MANAGED MOUNTABLE, A NON-LIBRARY-RESIDENT *
*                    TAPE DRIVE IS ALLOCATED.                  *
*                                                              *
*        2. DEVICE ALLOCATION PROCESSING                       *
*                                                              *
*           JOB STEP SETUP PROCESSING HAS DESIGNATED THE REQUEST AS *
*           SMS-MANAGED MOUNTABLE, BUT THE VOLUME HAS BEEN EJECTED *
*           FROM ITS LIBRARY.                                  *
*                                                              *
*           THE VOLUME STATES ARE THE SAME AS FOR JOB STEP SETUP *
*           PROCESSING.                                        *
*                                                              *
*           IN A JES2 ENVIRONMENT, IF THE EXIT CAUSES THE VOLUME TO *
*           BE ENTERED INTO ANY TAPE LIBRARY, THEN A LIBRARY-  *
*           RESIDENT TAPE DRIVE WILL BE ALLOCATED.            *
*                                                              *
*           IN A JES3 ENVIRONMENT, THE EXIT MUST CAUSE THE VOLUME TO *
*           BE ENTERED INTO THE SAME LIBRARY IN WHICH IT RESIDED *
*           DURING JOB STEP SETUP PROCESSING.  IN THIS CASE, A *
*           LIBRARY-RESIDENT TAPE DRIVE WILL BE SUCCESSFULLY   *
*           ALLOCATED.  IF THE EXIT CAUSES THE VOLUME TO BE ENTERED *
*           INTO A DIFFERENT LIBRARY, THEN THE JOB STEP WILL FAIL. *
*                                                              *
*           IF THE EXIT TAKES NO ACTION, THEN THE JOB STEP WILL *
*           FAIL.                                              *
*                                                              *
*        3. LIBRARY MOUNT PROCESSING                           *
*                                                              *
*           THE SYSTEM IS ATTEMPTING TO MOUNT THE VOLUME ON A  *
*           LIBRARY-RESIDENT TAPE DRIVE.                       *
*                                                              *
*           THE VOLUME MAY HAVE ONE OF FIVE STATES:            *
*              A. THE VOLUME IS KNOWN TO BE SHELF-RESIDENT.  THERE IS *
*                 A TAPE VOLUME RECORD FOR THE VOLUME IN THE TCDB. *
*              B. THE VOLUME IS KNOWN TO RESIDE IN A DIFFERENT *
*                 LIBRARY.  THERE IS A TAPE VOLUME RECORD FOR THE *
*                 VOLUME IN THE TCDB.                          *
```

Figure 34. Sample Volume Not in Library Installation Exit—CBRSPUXV (Part 3 of 13)

```
*              C. THE VOLUME IS KNOWN TO RESIDE IN THE CORRECT       *
*                 LIBRARY, BUT VOLUME EJECTION IS ALREADY IN PROGRESS *
*                 AND CANNOT BE CANCELED.  THERE IS CURRENTLY A TAPE  *
*                 VOLUME RECORD IN THE TCDB, BUT THIS MAY BE PURGED   *
*                 WHEN VOLUME EJECTION COMPLETES.                     *
*              D. THE VOLUME IS UNKNOWN TO THE SYSTEM.  THERE IS NO   *
*                 TAPE VOLUME RECORD FOR THE VOLUME IN THE TCDB.      *
*              E. THE VOLUME IS KNOWN TO BE AN EXPORTED LOGICAL       *
*                 VOLUME. THERE IS A TAPE VOLUME RECORD IN THE        *
*                 TAPE CONFIGURATION DATABASE WITH STACKED=VOLSER     *
*                 IN THE SHELF LOCATION FIELD.                        *
*                                                                     *
*          NOTE: IF A LOGICAL VOLUME IS EXPORT PENDING OR IN          *
*          PROCESS OF BEING EXPORTED, THE VOLUME NOT IN LIBRARY       *
*          INSTALLATION EXIT WILL NOT BE INVOKED. FOR THE EXIT        *
*          TO BE INVOKED FOR A LOGICAL VOLUME, IT MUST HAVE           *
*          COMPLETED THE EXPORT PROCESS.                              *
*                                                                     *
*          IF THE EXIT CAUSES THE VOLUME TO BE ENTERED INTO THE       *
*          TAPE LIBRARY WHERE THE DRIVE RESIDES, THE VOLUME MOUNT     *
*          WILL BE RETRIED.                                           *
*                                                                     *
*          IF THE EXIT TAKES NO ACTION, THEN THE JOB STEP WILL        *
*          FAIL.                                                      *
*                                                                     *
*                                                                     *
*     NOTES:                                                          *
*                                                                     *
*       CHARACTER CODE:        EBCDIC                                 *
*                                                                     *
*       RESTRICTIONS:          NONE                                   *
*                                                                     *
*       REGISTER CONVENTIONS:                                         *
*         R0  - WORK REGISTER                                         *
*         R1  - STANDARD LINKAGE REGISTER                             *
*             - PARAMETER LIST ADDRESS                                *
*             - WORK REGISTER                                         *
*         R2  - NOT USED                                              *
*         R3  - NOT USED                                              *
*         R4  - NOT USED                                              *
*         R5  - NOT USED                                              *
*         R6  - NOT USED                                              *
*         R7  - NOT USED                                              *
*         R8  - SHFLOCFD BASE REGISTER                                *
*         R9  - RETURN CODE WORK REGISTER                             *
*         R10 - CBRUXVNL WORKING STORAGE BASE REGISTER               *
*         R11 - UXNPL BASE REGISTER                                   *
*         R12 - CBRUXVNL BASE REGISTER                                *
*         R13 - STANDARD LINKAGE REGISTER                             *
*             - SAVE AREA ADDRESS                                     *
```

Figure 34. Sample Volume Not in Library Installation Exit—CBRSPUXV (Part 4 of 13)

```
*         R14 - STANDARD LINKAGE REGISTER                        *
*             - RETURN POINT ADDRESS                             *
*             - WORK REGISTER                                    *
*         R15 - STANDARD LINKAGE REGISTER                        *
*             - ENTRY POINT ADDRESS                              *
*             - RETURN CODE                                      *
*             - WORK REGISTER                                    *
*                                                                *
*   MODULE TYPE:             CONTROL SECTION                     *
*                                                                *
*     PROCESSOR:             ASSEMBLER H                         *
*                                                                *
*     ATTRIBUTES:                                                *
*                                                                *
*      LOCATION:             JOB PACK AREA SUBPOOL 252           *
*      STATE:                CALLER'S                            *
*      AMODE:                31                                  *
*      RMODE:                ANY                                 *
*      KEY:                  CALLER'S                            *
*                            MAY BE DIFFERENT FROM JOB KEY       *
*      MODE:                 TASK                                *
*      SERIALIZATION:        UNLOCKED                            *
*      TYPE:                 REUSABLE                            *
*                            REENTRANT                           *
*                            REFRESHABLE                         *
*      AUTHORIZATION:        APF AUTHORIZED                      *
*                                                                *
*     LINKAGE:               STANDARD LINKAGE CONVENTIONS        *
*                                                                *
*     CALLING SEQUENCE:                                          *
*       CBRUXVNL IS INVOKED USING THE MVS LINK MACRO.            *
*                                                                *
*     INPUT:                                                     *
*       AT ENTRY TO CBRUXVNL, REGISTER 1 CONTAINS THE ADDRESS OF *
*       THE VOLUME NOT IN LIBRARY INSTALLATION EXIT PARAMETER LIST. *
*       THE PARAMETER LIST FORMAT IS GIVEN BY MAPPING MACRO      *
*       CBRUXNPL.                                                *
*                                                                *
*     OUTPUT:                                                    *
*       A RETURN CODE IS PLACED IN REGISTER 15:                  *
*         CODE  MEANING                                          *
*           0   CONTINUE NORMAL PROCESSING OF THIS REQUEST.  NO  *
*               CHANGE HAS BEEN MADE TO TAPE VOLUME RESIDENCE.   *
*           4   RETRY THE CURRENT OPERATION.  THE TAPE VOLUME HAS *
*               BEEN ENTERED INTO THE APPROPRIATE LIBRARY.       *
*           8   CANCEL THE JOB IMMEDIATELY.                      *
*          12   NOT USED.                                        *
*          16   DO NOT INVOKE THE VOLUME NOT IN LIBRARY          *
*               INSTALLATION EXIT AGAIN.  CONTINUE NORMAL        *
*               PROCESSING OF THE CURRENT REQUEST.  NO CHANGE HAS *
*               BEEN MADE TO TAPE VOLUME RESIDENCE.              *
*                                                                *
```

Figure 34. Sample Volume Not in Library Installation Exit—CBRSPUXV (Part 5 of 13)

```
*      EXIT NORMAL:                                              *
*        RETURN TO THE CALLER WITH ONE OF THE RETURN CODES DESCRIBED  *
*        ABOVE.                                                  *
*                                                               *
*      EXIT ERROR:  NONE                                         *
*                                                               *
*    EXTERNAL REFERENCES:                                        *
*                                                               *
*      ROUTINES:  NONE                                           *
*                                                               *
*      CONTROL BLOCKS:                                           *
*        CBRUXNPL - VOLUME NOT IN LIBRARY INSTALLATION           *
*                   EXIT PARAMETER LIST                 - R/O    *
*                                                               *
*    EXECUTABLE MACROS:                                          *
*      FREEMAIN                                                  *
*      GETMAIN                                                   *
*      RETURN                                                    *
*      SAVE                                                      *
*      WAIT                                                      *
*      WTO                                                       *
*      WTOR                                                      *
*                                                               *
*    MESSAGES:  VNL001 VOLUME NOT IN LIBRARY EXIT                *
*                      VOLUME (VOLSER) UNKNOWN TO SYSTEM         *
*                                     ON STACKED (VOLSER)        *
*                                     SHELF-RESIDENT             *
*                                     EJECT IN PROGRESS          *
*                                     IN LIBRARY (LIBNAME)       *
*                      DURING JOB STEP SETUP                     *
*                            DEVICE ALLOCATION                   *
*                            LIBRARY MOUNT                       *
*                      ENTER INTO ANY LIBRARY                    *
*                            LIBRARY (LIBNAME)                   *
*                                                               *
*            VNL002 REPLY 'CONT', 'RETRY', 'CANCEL', OR 'DISABLE'  *
*                                                               *
*    ABEND CODES:  NONE                                          *
**** END OF SPECIFICATIONS ********************************************
        TITLE 'CBRUXNPL - VOLUME NOT IN LIBRARY EXIT PARAMETER LIST'
        CBRUXNPL ,               VOLUME NOT IN LIBRARY PARAMETERS
        TITLE 'STANDARD REGISTER DEFINITIONS'
```

Figure 34. Sample Volume Not in Library Installation Exit—CBRSPUXV (Part 6 of 13)

```
*---------------------------------------------------------------------*
*                                                                     *
*          STANDARD REGISTER DEFINITIONS                              *
*                                                                     *
*---------------------------------------------------------------------*
R0       EQU   0                     GENERAL REGISTER 0
R1       EQU   1                     GENERAL REGISTER 1
R2       EQU   2                     GENERAL REGISTER 2
R3       EQU   3                     GENERAL REGISTER 3
R4       EQU   4                     GENERAL REGISTER 4
R5       EQU   5                     GENERAL REGISTER 5
R6       EQU   6                     GENERAL REGISTER 6
R7       EQU   7                     GENERAL REGISTER 7
R8       EQU   8                     GENERAL REGISTER 8
R9       EQU   9                     GENERAL REGISTER 9
R10      EQU   10                    GENERAL REGISTER 10
R11      EQU   11                    GENERAL REGISTER 11
R12      EQU   12                    GENERAL REGISTER 12
R13      EQU   13                    GENERAL REGISTER 13
R14      EQU   14                    GENERAL REGISTER 14
R15      EQU   15                    GENERAL REGISTER 15

         TITLE 'SHELF LOCATION FIELD FORMAT'
*---------------------------------------------------------------------*
*                                                                     *
*          SHELF LOCATION FIELD FORMAT. THE FOLLOWING DSECT           *
*          MAPS TO THE DEFAULT SHELF LOCATION FIELD.                  *
*                                                                     *
*---------------------------------------------------------------------*
SHFLOCFD DSECT ,                     MAPS THE TCDB SHELF LOC FIELD
STKVOLTX DS    CL8                   STACKED= VOLUME TEXT
STKVOLSR DS    CL6                   VOLSER FOR THE STACKED VOLUME
         DS    CL18                  AVAILABLE
         SPACE 2
         TITLE 'CBRUXVNL WORKING STORAGE'
*---------------------------------------------------------------------*
*                                                                     *
*          CBRUXVNL WORKING STORAGE                                   *
*                                                                     *
*---------------------------------------------------------------------*
VNLWORK  DSECT ,                     CBRUXVNL WORKING STORAGE
         SPACE 2
SAVE     DS    18F                   CBRUXVNL SAVE AREA
         SPACE 2
*---------------------------------------------------------------------*
*                                                                     *
*          MULTI-LINE WTO PARAMETER LIST                              *
*                                                                     *
*---------------------------------------------------------------------*
```

Figure 34. Sample Volume Not in Library Installation Exit—CBRSPUXV (Part 7 of 13)

```
          WTOLIST  WTO   TEXT=((,C),(,D),(,D),(,DE)),                           +
                         ROUTCDE=(3,5),                                         +
                         CONSNAME=,                                             +
                         MF=L
          WTOLISTL EQU   *-WTOLIST
                   SPACE 2
          *-------------------------------------------------------------------*
          *                                                                   *
          *        MULTI-LINE WTO TEXT LINES                                  *
          *                                                                   *
          *-------------------------------------------------------------------*
          CTRLLINE DS    0F                  MLWTO CONTROL LINE
                   DS    AL2                 LENGTH OF MESSAGE TEXT
                   DS    C'VNL001 VOLUME NOT IN LIBRARY EXIT'
          CTRLLEN  EQU   *-CTRLLINE          LENGTH OF CONTROL LINE
                   SPACE 2
          VOLLINE  DS    0F                  VOLUME INFORMATION LINE
                   DS    AL2                 LENGTH OF MESSAGE TEXT
                   DS    C'VOLUME '
          VOLSER   DS    CL6                 MISSING VOLUME SERIAL NUMBER
                   DS    C' '
          VOLSTATE DS    CL19'UNKNOWN TO SYSTEM  '  ERROR ASSOCIATED WITH VOLUME
          VOLLEN   EQU   *-VOLLINE           LENGTH OF VOLUME INFORMATION LINE
                   SPACE 2
          VOLLOGCL DS    0CL19               WHERE THE LOGICAL VOLUME LIVES
                   DS    C'ON STACKED '
          VOLSTKVS DS    CL6                 VOLSER FOR THE STACKED VOLUME
                   DS    CL2' '
                   SPACE 2
          VOLLIBER DS    0CL19               VOLUME IN WRONG LIBRARY ERROR
                   DS    C'IN LIBRARY '
          VOLCLIB  DS    CL8                 LIBRARY WHERE VOLUME RESIDES
                   SPACE 2
          STAGLINE DS    0F                  PROCESSING STAGE LINE
                   DS    AL2                 LENGTH OF MESSAGE TEXT
                   DS    C'DURING '
          STAGE    DS    CL17'JOB STEP SETUP  '  PROCESSING STAGE
          STAGLEN  EQU   *-STAGLINE          LENGTH OF PROCESSING STAGE LINE
                   SPACE 2
          ACTLINE  DS    0F                  ACTION REQUIRED LINE
                   DS    AL2                 LENGTH OF MESSAGE TEXT
                   DS    C'ENTER INTO '
          ACTLIB   DS    CL16'ANY LIBRARY     '  TARGET LIBRARY IDENTIFICATION
          ACTLEN   EQU   *-ACTLINE           LENGTH OF ACTION REQUIRED LINE
                   SPACE 2
          ACTSPLIB DS    0CL16               SPECIFIC TARGET LIBRARY TEXT
                   DS    C'LIBRARY '
          ACTTLIB  DS    CL8                 TARGET LIBRARY NAME
                   SPACE 2
```

Figure 34. Sample Volume Not in Library Installation Exit—CBRSPUXV (Part 8 of 13)

```
*--------------------------------------------------------------------*
*                                                                    *
*       WTOR PARAMETER LIST AND RELATED FIELDS                       *
*                                                                    *
*--------------------------------------------------------------------*
WTORLIST WTOR  TEXT=(,,,),                                           +
               ROUTCDE=(3,5),                                        +
               CONSNAME=,                                            +
               MF=L
WTORLSTL EQU   *-WTORLIST
         SPACE 2
WTORECB  DS    F                    WTOR EVENT CONTROL BLOCK
WTORREP  DS    CL7                  WTOR REPLY AREA
         SPACE 2
WORKEND  DS    0D                   END OF CBRUXVNL WORKING STORAGE
WORKLEN  EQU   *-VNLWORK            CBRUXVNL WORKING STORAGE LENGTH
         TITLE 'CBRUXVNL - VOLUME NOT IN LIBRARY INSTALLATION EXIT'
*--------------------------------------------------------------------*
*                                                                    *
*       CBRUXVNL ENTRY POINT                                         *
*                                                                    *
*--------------------------------------------------------------------*
CBRUXVNL CSECT ,                    VOLUME NOT IN LIBRARY INST EXIT
CBRUXVNL AMODE 31
CBRUXVNL RMODE ANY
         SAVE  (14,12),,            SAVE CALLER'S REGISTERS AND       +
               'CBRUXVNL&SYSDATE'     MARK ENTRY POINT
         LR    R12,R15              COPY ENTRY POINT ADDRESS
         USING CBRUXVNL,R12         CBRUXVNL BASE REGISTER
         LR    R11,R1               COPY PARAMETER ADDRESS
         USING UXNPL,R11            VOLUME NOT IN LIBRARY PARAMETERS
         LA    R8,UXNSHLOC          ADDRESS OF THE TCDB SHELF LOC
         USING SHFLOCFD,R8          SHELF LOCATION FIELD
         GETMAIN  RU,               GETMAIN WORKING STORAGE FROM      +
               LV=WORKLEN,            SUBPOOL 230 TO GET PSW KEY      +
               SP=230                 STORAGE
         LR    R10,R1               SAVE WORKING STORAGE ADDRESS
         USING VNLWORK,R10          CBRUXVNL WORKING STORAGE
         LR    R14,R1               START ADDRESS OF TARGET AREA
         LA    R15,WORKLEN          TARGET LENGTH
         LR    R0,R1                START ADDRESS OF SOURCE AREA
         SR    R1,R1                ZERO SOURCE LENGTH AND PAD BYTE
         MVCL  R14,R0               CLEAR WORKING STORAGE
         ST    R13,SAVE+4           BACKWARD CHAIN SAVE AREAS
         LA    R0,SAVE              CBRUXVNL SAVE AREA ADDRESS
         ST    R0,8(,R13)           FORWARD CHAIN SAVE AREAS
         LR    R13,R0               SET CBRUXVNL SAVE AREA ADDRESS
         EJECT ,
*********************************************************************
```

Figure 34. Sample Volume Not in Library Installation Exit—CBRSPUXV (Part 9 of 13)

```
      ***********************************************************************
      *                                                                     *
      *        AT THIS POINT, A CALL TO THE INSTALLATION TAPE MANAGEMENT    *
      *        SYSTEM SHOULD BE MADE TO GATHER INFORMATION ABOUT THE        *
      *        VOLUME.                                                       *
      *                                                                     *
      ***********************************************************************
      ***********************************************************************
              EJECT ,
      *---------------------------------------------------------------------*
      *                                                                     *
      *        COPY THE MODEL WTO PARAMETER LIST TO DYNAMIC STORAGE         *
      *                                                                     *
      *---------------------------------------------------------------------*
              MVC    WTOLIST(WTOLISTL),WTOMODEL  WTO PARAMETER LIST
              MVC    CTRLLINE(CTRLLEN),CTRLMODL  MLWTO CONTROL LINE
              MVC    VOLLINE(VOLLEN),VOLMODL     VOLUME INFORMATION LINE
              MVC    STAGLINE(STAGLEN),STAGMODL  PROCESSING STAGE LINE
              MVC    ACTLINE(ACTLEN),ACTMODL     ACTION REQUIRED LINE
              SPACE 2
      *---------------------------------------------------------------------*
      *                                                                     *
      *        COMPLETE THE TEXT INSERTS FOR THE MULTI-LINE WTO             *
      *                                                                     *
      *---------------------------------------------------------------------*
              MVC    VOLSER,UXNVOLSR       SET VOLUME SERIAL NUMBER
              CLI    UXNERROR,UXNNTCDB     VOLUME UNKNOWN TO SYSTEM?
              BE     VNL1600              YES. GO CHECK PROCESSING STAGE
              CLI    UXNERROR,UXNSHELF     VOLUME SHELF-RESIDENT?
              BE     VNL1200              YES. GO SET INSERT
              CLI    UXNERROR,UXNEJECT     VOLUME EJECT IN PROGRESS?
              BE     VNL1400              YES. GO SET INSERT
              MVC    VOLLIBER,=CL19'IN LIBRARY LIB-NAME'  WRONG LIBRARY
              MVC    VOLCLIB,UXNLIBRS      LIBRARY WHERE VOLUME NOW RESIDES
              MVC    VOLSTATE,VOLLIBER     SET DIFFERENT LIBRARY INSERT
              B      VNL1600              GO CHECK PROCESSING STAGE
      VNL1200 DS     0H
              CLC    STKVOLTX,=CL8'STACKED=' COMPARE SHELF LOC FIELD
              BE     VNL1300                 YES. GO SET SHELF LOCATION
              MVC    VOLSTATE,=CL19'SHELF-RESIDENT'
              B      VNL1600              GO CHECK PROCESSING STAGE
      VNL1300 DS     0H
              MVC    VOLLOGCL,=CL19'ON STACKED VOLSER  '  STACKED VOLUME
              MVC    VOLSTKVS,STKVOLSR
              MVC    VOLSTATE,VOLLOGCL
              B      VNL1600              GO CHECK PROCESSING STAGE
      VNL1400 DS     0H
              MVC    VOLSTATE,=CL19'EJECT IN PROGRESS'
```

Figure 34. Sample Volume Not in Library Installation Exit—CBRSPUXV (Part 10 of 13)

```
VNL1600  DS    0H
         CLI   UXNWHERE,UXNSETUP    JOB STEP SETUP PROCESSING?
         BE    VNL2000             YES. GO SET ACTION
         CLI   UXNWHERE,UXNALLOC   DEVICE ALLOCATION PROCESSING?
         BE    VNL1800             YES. GO SET INSERT
         MVC   STAGE,=CL17'LIBRARY MOUNT'  SET LIBRARY MOUNT INSERT
         B     VNL2000             GO SET ACTION
VNL1800  DS    0H
         MVC   STAGE,=CL17'DEVICE ALLOCATION'  SET ALLOCATION INSERT
VNL2000  DS    0H
         CLC   UXNLIB,=CL8' '      TARGET LIBRARY UNKNOWN?
         BE    VNL3000             YES. GO ISSUE MLWTO
         MVC   ACTSPLIB,=CL16'LIBRARY LIB-NAME'  TARGET LIBRARY TEXT
         MVC   ACTTLIB,UXNLIB      LIBRARY WHERE VOLUME NEEDED
         MVC   ACTLIB,ACTSPLIB     SET TARGET LIBRARY INSERT
         EJECT ,
*---------------------------------------------------------------------*
*                                                                     *
*        ISSUE THE MULTI-LINE WTO                                     *
*                                                                     *
*---------------------------------------------------------------------*
VNL3000  DS    0H
         SR    R0,R0               CLEAR R0 BEFORE MULTI-LINE WTO
         WTO   TEXT=(CTRLLINE,VOLLINE,STAGLINE,ACTLINE),            +
               CONSNAME=UXNLCON,                                    +
               MF=(E,WTOLIST)
         EJECT ,
*---------------------------------------------------------------------*
*                                                                     *
*        ISSUE THE WTOR                                               *
*                                                                     *
*---------------------------------------------------------------------*
         MVC   WTORLIST(WTORLSTL),WTORMODL  COPY WTOR PARAMETER LIST
         SR    R15,R15             GET CONSTANT ZERO
         ST    R15,WTORECB         CLEAR WTOR ECB
         MVC   WTORREP,=CL7' '     SET WTOR REPLY AREA TO BLANKS
         SR    R0,R0               CLEAR R0 BEFORE WTOR
         WTOR  TEXT=(WTORLINE,WTORREP,L'WTORREP,WTORECB),           +
               CONSNAME=UXNLCON,                                    +
               MF=(E,WTORLIST,EXTENDED)
         WAIT  1,                  WAIT FOR OPERATOR REPLY          +
               ECB=WTORECB
         SPACE 2
*---------------------------------------------------------------------*
*                                                                     *
*        CHECK THE OPERATOR REPLY                                     *
*                                                                     *
```

Figure 34. Sample Volume Not in Library Installation Exit—CBRSPUXV (Part 11 of 13)

```
       *----------------------------------------------------------------------*
               OC    WTORREP,=CL7' '       CONVERT RESPONSE TO UPPER CASE
               LA    R9,UXNNORML           SET CONTINUE RETURN CODE
               CLC   WTORREP,=CL7'CONT'    CONTINUE (VOLUME NOT ENTERED)?
               BE    VNLEXIT               YES. EXIT WITH PRESET RETURN CODE
               LA    R9,UXNRETRY           SET RETRY RETURN CODE
               CLC   WTORREP,=CL7'RETRY'   RETRY (VOLUME ENTERED)?
               BE    VNLEXIT               YES. EXIT WITH PRESET RETURN CODE
               LA    R9,UXNFAIL            SET CANCEL RETURN CODE
               CLC   WTORREP,=CL7'CANCEL'  CANCEL JOB STEP?
               BE    VNLEXIT               YES. EXIT WITH PRESET RETURN CODE
               LA    R9,UXNDONT            SET DISABLE EXIT RETURN CODE
               CLC   WTORREP,=CL7'DISABLE'  DISABLE EXIT?
               BNE   VNL3000               NO. REISSUE MLWTO AND WTOR
               EJECT ,
       *----------------------------------------------------------------------*
       *                                                                      *
       *       RETURN TO THE CALLER                                           *
       *                                                                      *
       *----------------------------------------------------------------------*
       VNLEXIT DS    0H
               L     R13,SAVE+4            RESTORE CALLER'S SAVE AREA ADDRESS
               FREEMAIN  RU,               RELEASE WORKING STORAGE            +
                     LV=WORKLEN,                                              +
                     A=(R10),                                                 +
                     SP=230
               LR    R15,R9                SET RETURN CODE
               RETURN (14,12),            RESTORE CALLER'S REGISTERS, THEN    +
                     RC=(15)                  RETURN TO CALLER
               TITLE 'CBRUXVNL CONSTANTS'
       *----------------------------------------------------------------------*
       *                                                                      *
       *       CBRUXVNL CONSTANTS                                             *
       *                                                                      *
       *----------------------------------------------------------------------*
               SPACE 2
               LTORG ,                     LITERAL CONSTANTS
               SPACE 2
       *----------------------------------------------------------------------*
       *                                                                      *
       *       MODEL MULTI-LINE WTO PARAMETER LIST                            *
       *                                                                      *
       *----------------------------------------------------------------------*
       WTOMODEL WTO   TEXT=((,C),(,D),(,D),(,DE)),                           +
                     ROUTCDE=(3,5),                                          +
                     CONSNAME=,                                              +
                     MF=L
               SPACE 2
```

Figure 34. Sample Volume Not in Library Installation Exit—CBRSPUXV (Part 12 of 13)

```
*---------------------------------------------------------------------*
*                                                                     *
*          MODEL MULTI-LINE WTO TEXT LINES                            *
*                                                                     *
*---------------------------------------------------------------------*
CTRLMODL DC    0F'0'                     MLWTO CONTROL LINE MODEL
         DC    AL2(CTRLMLEN-2)
         DC    C'VNL001 VOLUME NOT IN LIBRARY EXIT'
CTRLMLEN EQU   *-CTRLMODL
         SPACE 2
VOLMODL  DC    0F'0'                     VOLUME INFORMATION LINE MODEL
         DC    AL2(VOLMLEN-2)
         DC    C'VOLUME '
         DC    C'VOLSER'
         DC    C' '
         DC    CL19'UNKNOWN TO SYSTEM  '
VOLMLEN  EQU   *-VOLMODL
         SPACE 2
STAGMODL DC    0F'0'                     PROCESSING STAGE LINE MODEL
         DC    AL2(STAGMLEN-2)
         DC    C'DURING '
         DC    CL17'JOB STEP SETUP   '
STAGMLEN EQU   *-STAGMODL
         SPACE 2
ACTMODL  DC    0F'0'                     ACTION REQUIRED LINE MODEL
         DC    AL2(ACTMLEN-2)
         DC    C'ENTER INTO '
         DC    CL16'ANY LIBRARY     '
ACTMLEN  EQU   *-ACTMODL
         SPACE 2
*---------------------------------------------------------------------*
*                                                                     *
*          MODEL WTOR PARAMETER LIST                                  *
*                                                                     *
*---------------------------------------------------------------------*
WTORMODL WTOR  TEXT=(,,,),                                             +
               ROUTCDE=(3,5),                                         +
               CONSNAME=,                                             +
               MF=L
         SPACE 2
*---------------------------------------------------------------------*
*                                                                     *
*          MODEL WTOR TEXT LINE                                       *
*                                                                     *
*---------------------------------------------------------------------*
WTORLINE DC    0F'0'                     WTOR MESSAGE TEXT
         DC    AL2(WTORLEN-2)
         DC    C'VNL002 REPLY ''CONT'', ''RETRY'', ''CANCEL'', OR ''DIS+
               ABLE'''
WTORLEN  EQU   *-WTORLINE
         SPACE 2
         END   CBRUXVNL
```

Figure 34. Sample Volume Not in Library Installation Exit—CBRSPUXV (Part 13 of 13)

SAMPLIB Member CBRAPROC

This SAMPLIB member is an example of a program that allows you to create the OAM member in the PROCLIB.

```
//CBRAPROC JOB  MSGLEVEL=(1,1),MSGCLASS=A
//*********************************************************************
//*
//*  $SEG(CBRAPROC) COMP(OSMC) PROD(OAM):
//*
//*  OAM Update PROCLIB Job (for OAM procedure).
//*
//*  This job creates a procedure in PROCLIB that can be used
//*  to start OAM.
//*
//*  NOTE: If the DB2* load module library containing DSNALI is
//*        not in the LNKLST concatenation, either include
//*        the DB2 load module library in the SYS1.LINKLIB
//*        concatenation (LNKLSTxx) or add a STEPLIB DD to
//*        this PROCEDURE.
//*********************************************************************
//          EXEC PGM=IEBUPDTE,PARM=NEW
//SYSPRINT DD   SYSOUT=A
//SYSUT2   DD   DSNAME=SYS1.PROCLIB,DISP=SHR
//SYSIN    DD   DATA
./        ADD   NAME=OAM,LEVEL=01,SOURCE=0,LIST=ALL
./     NUMBER   NEW1=10,INCR=10
//OAM PROC OSMC=YES,MAXS=2,UNLOAD=9999,EJECT=LRW,RESTART=YES
//IEFPROC EXEC PGM=CBROAM,REGION=0M,
// PARM=('OSMC=&OSMC,APLAN=CBROAM,MAXS=&MAXS,UNLOAD=&UNLOAD,'
//        'EJECT=&EJECT,RESTART=&RESTART')
//SYSABEND DD SYSOUT=A
./     ENDUP
/*
```

Figure 35. Sample CBRAPROC Program That Creates the OAM Member in PROCLIB

SAMPLIB Member CBRSPSIM

This SAMPLIB JCL writes the two required files on the import list volume using a scratch volume.

```
//CBRSPSIM  JOB 1,'IMPORT',MSGLEVEL=(1,1)
//*********************************************************************
//*
//*  $SEG(CBRSPSIM) COMP(SAM) PROD(OAM):
//*
//*  SAMPLE JOB THAT USES A SCRATCH VOLUME TO WRITE THE
//*  IMPORT LIST VOLUME.
//*
//*  BEFORE RUNNING THIS JOB, YOU MUST ALTER THE JCL.
//*  THIS JCL IS AN EXAMPLE.  THE VOLUME SERIAL NUMBERS AND
//*  DATASET NAMES ARE FICTIONAL.
//*
//*********************************************************************
//*********************************************************************
//* DO NOT USE COMPACTION WHEN WRITING THE IMPORT LIST VOLUME FILES.
//*********************************************************************
//* USING A LOGICAL SCRATCH VOLUME, CREATE THE IMPORT LIST VOLUME WITH
//* THE 2 REQUIRED FILES.  IN ORDER TO ENSURE THAT A SCRATCH VOLUME
//* IS ALLOCATED IN THE TARGET LIBRARY FOR THE IMPORT OPERATION,
//* THE ACS ROUTINES NEED TO HAVE LOGIC TO ALLOCATE A TAPE
//* DRIVE IN THE TARGET LIBRARY.  ONE WAY TO ACCOMPLISH THIS IS TO
//* HAVE A STORAGE GROUP UNIQUE TO EACH VTS LIBRARY PROVIDING A
//* 1 TO 1 RELATIONSHIP BETWEEN STORAGE GROUP AND LIBRARY.
//* THE ACS ROUTINES WOULD THEN NEED TO KEY OFF OF SOMETHING
//* UNIQUE IN THE DD STATEMENT (DATASET NAME, DATACLASS SPECIFICATION,
//* UNIT SPECIFICATION, ETC ...) TO GET THE CORRECT STORAGE GROUP
//* AND THE RIGHT TARGET LIBRARY SELECTED.
//*********************************************************************
//* FILE SEQUENCE 1:  LIST OF VOLUMES TO IMPORT
//*-------------------------------------------------------------------
//* THE FILE IDENTIFIER AND VERSION NUMBER IS DEFINED IN THE FIRST
//* RECORD AND MUST BE SPECIFIED AS ILLUSTRATED BELOW, STARTING IN
//* THE FIRST COLUMN:
//* IMPORT LIST 01
//*-------------------------------------------------------------------
//* AN OPTIONAL 16 CHARACTER USER FIELD CAN FOLLOW THE VERSION NUMBER
//* WITH A BLANK SPACE SEPARATING THE FIELDS.
//*-------------------------------------------------------------------
//* FOLLOWING THE IMPORT LIST FILE IDENTIFYING RECORD, THE LIST OF
//* FILE RECORDS CONTAIN A MAXIMUM OF THREE FIELDS SEPARATED BY
//* DELIMITERS.  THE THREE FIELDS CONSIST OF THE STACKED VOLSER, THE
//* LOGICAL VOLSER AND THE IMPORT OPTION.  THEY MUST APPEAR IN THAT
//* ORDER SEPARATED BY FIELD DELIMITERS.  BOTH THE LOGICAL VOLSER
//* AND THE IMPORT OPTION ARE OPTIONAL.
//*-------------------------------------------------------------------
//* THE STACKED VOLSER FIELD IS 1-6 CHARACTERS LONG.
//* THIS IS THE STACKED VOLUME CONTAINING THE LOGICAL VOLUMES TO
//* IMPORT.
```

Figure 36. Sample JCL for an Import List Volume Using a Scratch Volume (Part 1 of 3)

```
//*--------------------------------------------------------------------
//* THE FIELD DELIMITER MUST BE A COMMA.
//*--------------------------------------------------------------------
//* THE LOGICAL VOLSER FIELD IS 6 CHARACTERS LONG.  IF THE
//* FIELD IS ALL BLANKS, ALL LOGICAL VOLUMES ON THE SPECIFIED
//* STACKED VOLUME WILL BE IMPORTED.
//*--------------------------------------------------------------------
//* THE FIELD DELIMITER MUST BE A COMMA.
//*--------------------------------------------------------------------
//* THE IMPORT OPTION CAN BE OMITTED (BLANK) WHICH INDICATES THAT
//* THE DATA CONTENTS OF THE LOGICAL VOLUME IS COPIED INTO THE VTS
//* SUBSYSTEM AND A DATA FRAGMENT FILE ENTRY AND LIBRARY MANAGER
//* RECORD ARE ALSO CREATED.  THE OPTION SPECIFIED CAN BE "SCRATCH"
//* WHICH INDICATES THAT ONLY A DATA FRAGMENT FILE ENTRY AND LIBRARY
//* MANAGER RECORD ARE CREATED (DATA CONTENTS NOT COPIED), OR THE
//* OPTION SPECIFIED CAN BE "INITIALIZE" WHICH INDICATES THAT ONLY
//* THE LIBRARY MANAGER RECORD FOR THE VOLUME IS CREATED.  IF A
//* LOGICAL VOLSER IS NOT INCLUDED WITH THE STACKED VOLSER, THE
//* IMPORT OPTION SPECIFIED APPLIES TO ALL LOGICAL VOLUMES ON THE
//* STACKED VOLUME.
//*--------------------------------------------------------------------
//* FOR MORE DETAILED INFORMATION ON THE REQUIRED FORMAT
//* REFER TO THE MAGSTAR 3494 TAPE LIBRARY OPERATOR GUIDE.
//*********************************************************************
//STEP1     EXEC PGM=IEBGENER
//SYSPRINT  DD  SYSOUT=*
//SYSUT2    DD DSN=HILEVELQ.IMPLIST,
//             UNIT=3490,LABEL=(,SL),
//             DISP=(NEW,KEEP),VOL=(,RETAIN),
//             DCB=(RECFM=FB,BLKSIZE=80,LRECL=80,TRTCH=NOCOMP)
//SYSUT1    DD *
IMPORT LIST 01
STKD01,LOGCL1
STKD02,LOGCL2
STKD03
/*
//SYSIN   DD  DUMMY
//*
//*********************************************************************
//* FILE SEQUENCE 2:  IMPORT STATUS FILE
//*--------------------------------------------------------------------
//* THE FILE IDENTIFIER AND VERSION NUMBER IS DEFINED IN THE FIRST
//* RECORD AND MUST BE SPECIFIED AS ILLUSTRATED BELOW, STARTING IN
//* THE FIRST COLUMN:
//* IMPORT STATUS 01
//*--------------------------------------------------------------------
//* AN OPTIONAL 16 CHARACTER USER FIELD CAN FOLLOW THE VERSION NUMBER
//* WITH A BLANK SPACE SEPARATING THE FIELDS.
```

Figure 36. Sample JCL for an Import List Volume Using a Scratch Volume (Part 2 of 3)

```
//*------------------------------------------------------------------
//* CHECK THIS FILE AFTER THE IMPORT OPERATION IS COMPLETED FOR
//* INDIVIDUAL VOLUME IMPORT RESULTS.
//*------------------------------------------------------------------
//* FOR DETAILED INFORMATION ON THE STATUS FILE REFER TO THE
//* MAGSTAR 3494 TAPE LIBRARY OPERATOR GUIDE.
//*******************************************************************
//STEP2    EXEC PGM=IEBGENER,COND=(4,LT)
//SYSPRINT  DD  SYSOUT=*
//SYSUT1   DD *
IMPORT STATUS 01
/*
//SYSUT2   DD DSN=HILEVELQ.IMPSTATS,
//           VOL=(,,REF=*.STEP1.SYSUT2),
//           UNIT=3490,LABEL=(2,SL),
//           DISP=(NEW,CATLG),
//           DCB=*.STEP1.SYSUT2
//SYSIN   DD  DUMMY
//*
//
```

Figure 36. Sample JCL for an Import List Volume Using a Scratch Volume (Part 3 of 3)

SAMPLIB Member CBRSPPIM

This SAMPLIB JCL writes the two required files on the import list volume using a private volume.

```
//CBRSPPIM  JOB 1,'IMPORT',MSGLEVEL=(1,1)
//*******************************************************************
/*
//*  $SEG(CBRSPPIM) COMP(SAM) PROD(OAM):
//*
//*  SAMPLE JOB THAT USES A PRIVATE VOLUME TO WRITE THE
//*  IMPORT LIST VOLUME AND INITIATE THE IMPORT OPERATION.
//*
//*  BEFORE RUNNING THIS JOB, YOU MUST ALTER THE JCL.
//*  THIS JCL IS AN EXAMPLE.  THE VOLUME SERIAL NUMBERS AND
//*  DATA SET NAMES ARE FICTIONAL.
//*
//*******************************************************************
//*******************************************************************
//* DO NOT USE COMPACTION WHEN WRITING THE IMPORT LIST VOLUME FILES.
//*******************************************************************
//* USING A LOGICAL PRIVATE VOLUME (IMP001), CREATE THE IMPORT LIST
//* VOLUME WITH THE 2 REQUIRED FILES.
//*******************************************************************
```

Figure 37. Sample JCL for an Import List Volume Using a Private Volume (Part 1 of 4)

```
//* FILE SEQUENCE 1:  LIST OF VOLUMES TO IMPORT
//*-------------------------------------------------------------------
//* THE FILE IDENTIFIER AND VERSION NUMBER IS DEFINED IN THE FIRST
//* RECORD AND MUST BE EXACTLY AS ILLUSTRATED BELOW, STARTING IN
//* THE FIRST COLUMN:
//* IMPORT LIST 01
//*-------------------------------------------------------------------
//* AN OPTIONAL 16 CHARACTER USER FIELD CAN FOLLOW THE VERSION NUMBER
//* WITH A BLANK SPACE SEPARATING THE FIELDS.
//*-------------------------------------------------------------------
//* FOLLOWING THE IMPORT LIST FILE IDENTIFYING RECORD, THE LIST OF
//* FILE RECORDS CONTAIN A MAXIMUM OF THREE FIELDS SEPARATED BY
//* DELIMITERS.  THE THREE FIELDS CONSIST OF THE STACKED VOLSER, THE
//* LOGICAL VOLSER AND THE IMPORT OPTION.  THEY MUST APPEAR IN THAT
//* ORDER SEPARATED BY FIELD DELIMITERS.  BOTH THE LOGICAL VOLSER
//* AND THE IMPORT OPTION ARE OPTIONAL.
//*-------------------------------------------------------------------
//* THE STACKED VOLSER FIELD IS 1-6 CHARACTERS LONG.
//* THIS IS THE STACKED VOLUME CONTAINING LOGICAL VOLUMES
//* TO BE IMPORTED.
//*-------------------------------------------------------------------
//* THE FIELD DELIMITER MUST BE A COMMA.
//*-------------------------------------------------------------------
//* THE LOGICAL VOLSER FIELD IS 6 CHARACTERS LONG.  IF THE
//* FIELD IS ALL BLANKS, ALL LOGICAL VOLUMES ON THE SPECIFIED
//* STACKED VOLUME WILL BE IMPORTED.
//*-------------------------------------------------------------------
//* THE FIELD DELIMITER MUST BE A COMMA.
//*-------------------------------------------------------------------
//* THE IMPORT OPTION CAN BE OMITTED (BLANK) WHICH INDICATES THAT
//* THE DATA CONTENTS OF THE LOGICAL VOLUME IS COPIED INTO THE VTS
//* SUBSYSTEM AND A DATA FRAGMENT FILE ENTRY AND LIBRARY MANAGER
//* RECORD ARE ALSO CREATED.  THE OPTION SPECIFIED CAN BE "SCRATCH"
//* WHICH INDICATES THAT ONLY A DATA FRAGMENT FILE ENTRY AND LIBRARY
//* MANAGER RECORD ARE CREATED (DATA CONTENTS NOT COPIED), OR THE
//* OPTION SPECIFIED CAN BE "INITIALIZE" WHICH INDICATES THAT ONLY
//* THE LIBRARY MANAGER RECORD FOR THE VOLUME IS CREATED.  IF A
//* LOGICAL VOLSER IS NOT INCLUDED WITH THE STACKED VOLSER, THE
//* IMPORT OPTION SPECIFIED APPLIES TO ALL LOGICAL VOLUMES ON THE
//* THE STACKED VOLUME.
//*-------------------------------------------------------------------
//* FOR MORE DETAILED INFORMATION ON THE REQUIRED FORMAT
//* REFER TO THE MAGSTAR 3494 TAPE LIBRARY OPERATOR GUIDE.
//********************************************************************
//STEP1    EXEC PGM=IEBGENER
//SYSPRINT DD  SYSOUT=*
//SYSUT1   DD *
IMPORT LIST 01
STKD01,LOGCL1
STKD02,LOGCL2
STKD03
/*
```

Figure 37. Sample JCL for an Import List Volume Using a Private Volume (Part 2 of 4)

```
//SYSUT2   DD DSN=HILEVELQ.IMPLIST,
//            UNIT=3490,LABEL=(,SL),
//            DISP=(NEW,KEEP),VOL=(,RETAIN,,,SER=IMP001),
//            DCB=(RECFM=FB,BLKSIZE=80,LRECL=80,TRTCH=NOCOMP)
//SYSIN   DD  DUMMY
//*
//*********************************************************************
//* FILE SEQUENCE 2:  IMPORT STATUS FILE
//*-------------------------------------------------------------------
//* THE FILE IDENTIFIER AND VERSION NUMBER IS DEFINED IN THE FIRST
//* RECORD AND MUST BE EXACTLY AS ILLUSTRATED BELOW, STARTING IN
//* THE FIRST COLUMN:
//* IMPORT STATUS 01
//*-------------------------------------------------------------------
//* AN OPTIONAL 16 CHARACTER USER FIELD CAN FOLLOW THE VERSION NUMBER
//* WITH A BLANK SPACE SEPARATING THE FIELDS.
//*-------------------------------------------------------------------
//* CHECK THIS FILE AFTER THE IMPORT OPERATION IS COMPLETED FOR
//* INDIVIDUAL VOLUME IMPORT RESULTS.
//*-------------------------------------------------------------------
//* FOR DETAILED INFORMATION ON THE STATUS FILE REFER TO THE
//* MAGSTAR 3494 TAPE LIBRARY OPERATOR GUIDE.
//*********************************************************************
//STEP2    EXEC PGM=IEBGENER,COND=(4,LT)
//SYSPRINT DD  SYSOUT=*
//SYSUT1   DD *
IMPORT STATUS 01
/*
//SYSUT2   DD DSN=HILEVELQ.IMPSTATS,
//            VOL=(,,REF=*.STEP1.SYSUT2),
//            UNIT=3490,LABEL=(2,SL),
//            DISP=(NEW,KEEP),
//            DCB=*.STEP1.SYSUT2
//SYSIN   DD  DUMMY
//*
//*****************************************************************
//* THE FOLLOWING STEP CAN BE USED TO INITIATE THE IMPORT
//* OPERATION AT THE LIBRARY.  USING THE CBRSPLCS SAMPLE PROGRAM
//* FROM SAMPLIB, CODE THE VOLSER NAME THAT WAS USED TO CREATE THE
//* IMPORT LIST VOLUME IN THE INPUT TRANSACTION RECORD.  REFER TO
//* THE CBRSPLCS SAMPLE PROGRAM FOR THE CORRECT SYNTAX FOR
//* INITIATING AN IMPORT OPERATION.  ONCE THE TRANSACTION RECORD
//* HAS BEEN CREATED, THE FOLLOWING STEP CAN BE UNCOMMENTED TO
//* INITIATE THE IMPORT OPERATION.
//*
//* NOTE:  THE FOLLOWING STEP COULD ALSO BE MODIFIED TO EXECUTE
//*        AN INSTALLATION'S UTILITY CAPABLE OF ISSUING THE
//*        LIBRARY IMPORT,VOLSER OPERATOR COMMAND.
//*
//*****************************************************************
```

Figure 37. Sample JCL for an Import List Volume Using a Private Volume (Part 3 of 4)

```
//*STEP3    EXEC PGM=CBRSPLCS,COND=(4,LT)
//*SYSPRINT DD SYSOUT=*
//*INDD     DD DSN=HILEVELQ.TRANSIN.IMPORT,DISP=OLD
//*OUTDD    DD DSN=HILEVELQ.TRANSOUT.IMPORT,UNIT=SYSDA,
//*           SPACE=(TRK,(1,1)),DISP=(NEW,CATLG)
//*SYSIN    DD DUMMY
//*
//
```

Figure 37. Sample JCL for an Import List Volume Using a Private Volume (Part 4 of 4)

SAMPLIB Member CBRSPSXP

This SAMPLIB JCL writes the three required files on the export list volume using a scratch volume.

```
//CBRSPSXP  JOB 1,'EXPORT',MSGLEVEL=(1,1)
//**********************************************************************
//*
//*  $SEG(CBRSPSXP) COMP(SAM) PROD(OAM):
//*
//*  SAMPLE JOB THAT USES A SCRATCH VOLUME TO WRITE THE
//*  EXPORT LIST VOLUME.
//*
//*  BEFORE RUNNING THIS JOB, YOU MUST ALTER THE JCL.
//*  THIS JCL IS AN EXAMPLE.  THE VOLUME SERIAL NUMBERS AND
//*  DATASET NAMES ARE FICTIONAL.
//*
//**********************************************************************
//**********************************************************************
//* DO NOT USE COMPACTION WHEN WRITING THE EXPORT LIST VOLUME FILES.
//**********************************************************************
//* USING A LOGICAL SCRATCH VOLUME, CREATE THE EXPORT LIST VOLUME WITH
//* THE 3 REQUIRED FILES.  IN ORDER TO ENSURE THAT A SCRATCH VOLUME
//* IS ALLOCATED IN THE TARGET LIBRARY FOR THE EXPORT OPERATION,
//* THE ACS ROUTINES NEED TO HAVE LOGIC TO ALLOCATE A TAPE
//* DRIVE IN THE TARGET LIBRARY.  ONE WAY TO ACCOMPLISH THIS IS TO
//* HAVE A STORAGE GROUP UNIQUE TO EACH VTS LIBRARY PROVIDING A
//* 1 TO 1 RELATIONSHIP BETWEEN STORAGE GROUP AND LIBRARY.
//* THE ACS ROUTINES WOULD THEN NEED TO KEY OFF OF SOMETHING
//* UNIQUE IN THE DD STATEMENT (DATASET NAME, DATACLASS SPECIFICATION,
//* UNIT SPECIFICATION, ETC ...) TO GET THE CORRECT STORAGE GROUP
//* AND THE RIGHT TARGET LIBRARY SELECTED.
//**********************************************************************
//* FILE SEQUENCE 1:  EXPORT LIST VOLUME FILE WITH LIST OF VOLUMES
//*   TO BE EXPORTED ALONG WITH THEIR DESTINATIONS.  ALL VOLUMES
//*   WITH THE SAME DESTINATION WILL BE GROUPED TOGETHER ON
//*   THE SAME SET OF STACKED VOLUMES.
//*----------------------------------------------------------------
```

Figure 38. Sample JCL for an Export List Volume Using a Scratch Volume (Part 1 of 3)

```
//* THE FILE IDENTIFIER AND VERSION NUMBER IS DEFINED IN THE FIRST
//* RECORD AND MUST BE SPECIFIED AS ILLUSTRATED BELOW, STARTING IN
//* THE FIRST COLUMN:
//* EXPORT LIST 01
//*-------------------------------------------------------------------
//* AN OPTIONAL 16 CHARACTER USER FIELD CAN FOLLOW THE VERSION NUMBER
//* WITH A BLANK SPACE SEPARATING THE FIELDS.
//*-------------------------------------------------------------------
//* FOLLOWING THE EXPORT LIST FILE IDENTIFYING RECORD, THE LIST OF
//* FILE RECORDS CONTAIN TWO FIELDS SEPARATED BY A DELIMITER.  THE
//* FIELDS, VOLSER AND DESTINATION, MUST APPEAR IN THAT ORDER
//* SEPARATED BY A FIELD DELIMITER.
//*-------------------------------------------------------------------
//* THE VOLSER FIELD IS 6 CHARACTERS LONG.
//*-------------------------------------------------------------------
//* THE FIELD DELIMITER MUST BE A COMMA.
//*-------------------------------------------------------------------
//* THE DESTINATION FIELD FOR THE LOGICAL VOLUME IS 1-16 CHARACTERS
//* LONG.  A BLANK DESTINATION IS ALSO VALID.
//*-------------------------------------------------------------------
//* FOR MORE DETAILED INFORMATION ON THE REQUIRED FORMAT
//* REFER TO THE MAGSTAR 3494 TAPE LIBRARY OPERATOR GUIDE.
//*******************************************************************
//STEP1     EXEC PGM=IEBGENER
//SYSPRINT  DD  SYSOUT=*
//SYSUT2    DD DSN=HILEVELQ.EXPLIST,
//             UNIT=3490,LABEL=(,SL),
//             DISP=(NEW,KEEP),VOL=(,RETAIN),
//             DCB=(RECFM=FB,BLKSIZE=80,LRECL=80,TRTCH=NOCOMP)
//SYSUT1    DD *
EXPORT LIST 01
VOLSR1,DISASTER
VOLSR2,DISASTER
VOLSR3,BACKUP
VOLSR4,BACKUP
VOLSR5
/*
//SYSIN    DD  DUMMY
//*
//*******************************************************************
//* FILE SEQUENCE 2:  RESERVED FILE (FOR FUTURE USE).
//*-------------------------------------------------------------------
//* THE RESERVED FILE MUST BE PRESENT, HOWEVER ITS LENGTH OR
//* CONTENTS IS NOT CHECKED OR USED.
//*******************************************************************
//STEP2     EXEC PGM=IEBGENER,COND=(4,LT)
//SYSPRINT  DD  SYSOUT=*
//SYSUT1    DD *
RESERVED FILE
/*
```

Figure 38. Sample JCL for an Export List Volume Using a Scratch Volume (Part 2 of 3)

```
//SYSUT2   DD DSN=HILEVELQ.RESERVED,
//            VOL=(,RETAIN,REF=*.STEP1.SYSUT2),
//            UNIT=3490,LABEL=(2,SL),
//            DISP=(NEW,KEEP),
//            DCB=*.STEP1.SYSUT2
//SYSIN   DD  DUMMY
//*
//*******************************************************************
//* FILE SEQUENCE 3:  EXPORT STATUS FILE
//*-----------------------------------------------------------------
//* THE FILE IDENTIFIER AND VERSION NUMBER IS DEFINED IN THE FIRST
//* RECORD AND MUST BE EXACTLY AS ILLUSTRATED BELOW, STARTING IN
//* THE FIRST COLUMN:
//* EXPORT STATUS 01
//*-----------------------------------------------------------------
//* AN OPTIONAL 16 CHARACTER USER FIELD CAN FOLLOW THE VERSION NUMBER
//* WITH A BLANK SPACE SEPARATING THE FIELDS.
//*-----------------------------------------------------------------
//* CHECK THIS FILE AFTER THE EXPORT OPERATION IS COMPLETED FOR
//* INDIVIDUAL VOLUME EXPORT RESULTS.
//*-----------------------------------------------------------------
//* FOR DETAILED INFORMATION ON THE STATUS FILE REFER TO THE
//* MAGSTAR 3494 TAPE LIBRARY OPERATOR GUIDE.
//*******************************************************************
//STEP3    EXEC PGM=IEBGENER,COND=(4,LT)
//SYSPRINT  DD  SYSOUT=*
//SYSUT1   DD *
EXPORT STATUS 01
/*
//SYSUT2   DD DSN=HILEVELQ.EXPSTATS,
//            VOLUME=(,,REF=*.STEP1.SYSUT2),
//            UNIT=3490,LABEL=(3,SL),
//            DISP=(NEW,CATLG),
//            DCB=*.STEP1.SYSUT2
//SYSIN   DD  DUMMY
//*
//
```

Figure 38. Sample JCL for an Export List Volume Using a Scratch Volume (Part 3 of 3)

SAMPLIB Member CBRSPPXP

This SAMPLIB JCL writes the three required files on the export list volume using a private volume.

```
//CBRSPPXP  JOB 1,'EXPORT',MSGLEVEL=(1,1)
//*********************************************************************
//*
//*  $SEG(CBRSPPXP) COMP(SAM) PROD(OAM):
//*
//*  SAMPLE JOB THAT USES A PRIVATE VOLUME TO WRITE THE
//*  EXPORT LIST VOLUME AND INITIATE THE EXPORT OPERATION.
//*
//*  BEFORE RUNNING THIS JOB, YOU MUST ALTER THE JCL.
//*  THIS JCL IS AN EXAMPLE.  THE VOLUME SERIAL NUMBERS AND
//*  DATASET NAMES ARE FICTIONAL.
//*
//*********************************************************************
//*********************************************************************
//* DO NOT USE COMPACTION WHEN WRITING THE EXPORT LIST VOLUME FILES.
//*********************************************************************
//* USING A LOGICAL PRIVATE VOLUME (EXP001), CREATE THE EXPORT LIST
//* VOLUME WITH THE 3 REQUIRED FILES.
//*********************************************************************
//* FILE SEQUENCE 1:  EXPORT LIST VOLUME FILE WITH LIST OF VOLUMES
//*   TO BE EXPORTED ALONG WITH THEIR DESTINATIONS.  ALL VOLUMES
//*   WITH THE SAME DESTINATION WILL BE GROUPED TOGETHER ON
//*   THE SAME SET OF STACKED VOLUMES.
//*-------------------------------------------------------------------
//* THE FILE IDENTIFIER AND VERSION NUMBER IS DEFINED IN THE FIRST
//* RECORD AND MUST BE EXACTLY AS ILLUSTRATED BELOW, STARTING IN
//* THE FIRST COLUMN:
//* EXPORT LIST 01
//*-------------------------------------------------------------------
//* AN OPTIONAL 16 CHARACTER USER FIELD CAN FOLLOW THE VERSION NUMBER
//* WITH A BLANK SPACE SEPARATING THE FIELDS.
//*-------------------------------------------------------------------
//* FOLLOWING THE EXPORT LIST FILE IDENTIFYING RECORD, THE LIST OF
//* FILE RECORDS CONTAIN TWO FIELDS SEPARATED BY A DELIMITER.  THE
//* FIELDS, VOLSER AND DESTINATION, MUST APPEAR IN THAT ORDER
//* SEPARATED BY A FIELD DELIMITER.
//*-------------------------------------------------------------------
//* THE VOLSER FIELD IS 6 CHARACTERS LONG.
//*-------------------------------------------------------------------
//* THE FIELD DELIMITER MUST BE A COMMA.
```

Figure 39. Sample JCL for an Export List Volume Using a Private Volume (Part 1 of 3)

```
//*--------------------------------------------------------------------
//* THE DESTINATION FIELD FOR THE LOGICAL VOLUME IS 1-16 CHARACTERS
//* LONG.  A BLANK DESTINATION IS ALSO VALID.
//*--------------------------------------------------------------------
//* FOR MORE DETAILED INFORMATION ON THE REQUIRED FORMAT
//* REFER TO THE MAGSTAR 3494 TAPE LIBRARY OPERATOR GUIDE.
//**********************************************************************
//STEP1    EXEC PGM=IEBGENER
//SYSPRINT DD  SYSOUT=*
//SYSUT1   DD *
EXPORT LIST 01
VOLSR1,DISASTER
VOLSR2,DISASTER
VOLSR3,BACKUP
VOLSR4,BACKUP
VOLSR5
/*
//SYSUT2   DD DSN=HILEVELQ.EXPLIST,
//            UNIT=3490,LABEL=(,SL),
//            DISP=(NEW,KEEP),VOL=(,RETAIN,,,SER=EXP001),
//            DCB=(RECFM=FB,BLKSIZE=80,LRECL=80,TRTCH=NOCOMP)
//SYSIN    DD  DUMMY
//*
//**********************************************************************
//* FILE SEQUENCE 2:  RESERVED FILE (FOR FUTURE USE).
//*--------------------------------------------------------------------
//* THE RESERVED FILE MUST BE PRESENT, HOWEVER ITS LENGTH OR
//* CONTENTS IS NOT CHECKED OR USED.
//**********************************************************************
//STEP2    EXEC PGM=IEBGENER,COND=(4,LT)
//SYSPRINT DD  SYSOUT=*
//SYSUT1   DD *
RESERVED FILE
/*
//SYSUT2   DD DSN=HILEVELQ.RESERVED,
//            VOL=(,RETAIN,REF=*.STEP1.SYSUT2),
//            UNIT=3490,LABEL=(2,SL),
//            DISP=(NEW,KEEP),
//            DCB=*.STEP1.SYSUT2
//SYSIN    DD  DUMMY
//*
//**********************************************************************
//* FILE SEQUENCE 3:  EXPORT STATUS FILE
//*--------------------------------------------------------------------
//* THE FILE IDENTIFIER AND VERSION NUMBER IS DEFINED IN THE FIRST
//* RECORD AND MUST BE EXACTLY AS ILLUSTRATED BELOW, STARTING IN
//* THE FIRST COLUMN:
//* EXPORT STATUS 01
```

Figure 39. Sample JCL for an Export List Volume Using a Private Volume (Part 2 of 3)

```
//*---------------------------------------------------------------------
//* AN OPTIONAL 16 CHARACTER USER FIELD CAN FOLLOW THE VERSION NUMBER
//* WITH A BLANK SPACE SEPARATING THE FIELDS.
//*---------------------------------------------------------------------
//* CHECK THIS FILE AFTER THE EXPORT OPERATION IS COMPLETED FOR
//* INDIVIDUAL VOLUME EXPORT RESULTS.
//*---------------------------------------------------------------------
//* FOR DETAILED INFORMATION ON THE STATUS FILE REFER TO THE
//* MAGSTAR 3494 TAPE LIBRARY OPERATOR GUIDE.
//*****************************************************************
//STEP3    EXEC PGM=IEBGENER,COND=(4,LT)
//SYSPRINT  DD  SYSOUT=*
//SYSUT1    DD *
EXPORT STATUS 01
/*
//SYSUT2   DD DSN=HILEVELQ.EXPSTATS,
//            VOLUME=(,,REF=*.STEP1.SYSUT2),
//            UNIT=3490,LABEL=(3,SL),
//            DISP=(NEW,KEEP),
//            DCB=*.STEP1.SYSUT2
//SYSIN    DD  DUMMY
//*
//*****************************************************************
//* THE FOLLOWING STEP CAN BE USED TO INITIATE THE EXPORT
//* OPERATION AT THE LIBRARY.  USING THE CBRSPLCS SAMPLE PROGRAM
//* FROM SAMPLIB, CODE THE VOLSER NAME THAT WAS USED TO CREATE THE
//* EXPORT LIST VOLUME IN THE INPUT TRANSACTION RECORD.  REFER TO
//* THE CBRSPLCS SAMPLE PROGRAM FOR THE CORRECT SYNTAX FOR
//* INITIATING AN EXPORT OPERATION.  ONCE THE TRANSACTION RECORD
//* HAS BEEN CREATED, THE FOLLOWING STEP CAN BE UNCOMMENTED TO
//* INITIATE THE EXPORT OPERATION.
//*
//* NOTE:  THE FOLLOWING STEP COULD ALSO BE MODIFIED TO EXECUTE
//*        AN INSTALLATION'S UTILITY CAPABLE OF ISSUING THE
//*        LIBRARY EXPORT,VOLSER OPERATOR COMMAND.
//*
//*****************************************************************
//*STEP4    EXEC PGM=CBRSPLCS,COND=(4,LT)
//*SYSPRINT DD SYSOUT=*
//*INDD     DD DSN=HILEVELQ.TRANSIN.EXPORT,DISP=OLD
//*OUTDD    DD DSN=HILEVELQ.TRANSOUT.EXPORT,UNIT=SYSDA,
//*            SPACE=(TRK,(1,1)),DISP=(NEW,CATLG)
//*SYSIN    DD DUMMY
//*
//
```

Figure 39. Sample JCL for an Export List Volume Using a Private Volume (Part 3 of 3)

Appendix B. ISMF Panels to Define and Monitor Your Configuration

This chapter discusses typical ISMF functions for defining and monitoring the SMS configuration and tape volumes associated with your tape library:

- "Defining a Tape Library" on page 245.
- "Displaying Tape Library Attributes" on page 252.
- "Redefining a Tape Library" on page 255.
- "Altering a Tape Library" on page 258.
- "Copying Tape Library Definitions" on page 261.
- "Deleting a Tape Library Definition" on page 262.
- "Creating a List of Tape Libraries" on page 271.
- "Auditing Volumes in a Tape Library" on page 273.
- "Altering the Volume Record" on page 277.
- "Ejecting a Volume from a Tape Library" on page 283.

ISMF for the Storage Administrator

The Interactive Storage Management Facility (ISMF) supports the system administrator in managing tape libraries and tape volumes through the use of panels and line operator commands. These panels and commands are used to list, define, display, and alter the tape library and tape volume attributes that make up the installation's SMS configuration.

The following series of panels illustrate examples of using ISMF to list, define, display, and alter information concerning the automated and manual tape library dataserver through the use of ISMF panels and line operators.

Defining a Tape Library

ISMF provides a library management function to allow the storage administrator to use a series of panels to easily define the tape libraries needed for their installation.

To define a tape library, the storage administrator selects option 10, LIBRARY MANAGEMENT, from the ISMF Primary Option Menu (as shown in Figure 40 on page 246) to start the library management dialog.

Note: When defining the libraries associated with the Peer-to-Peer VTS Subsystem, remember to define the composite library along with the associated distributed libraries. From an ISMF define perspective, each library is defined as a separate tape library. Their association is established once communication is made to the library.

```
   Panel  Help
--------------------------------------------------------------------------
                        ISMF PRIMARY OPTION MENU - DFSMS/MVS 1.4
Enter Selection or Command ===>

Select one of the following options and press Enter:

 0  ISMF Profile              - Specify ISMF user profile
 1  Data Set                  - Perform Functions Against Data Sets
 2  Volume                    - Perform Functions Against Volumes
 3  Management Class          - Specify Data Set Backup and Migration Criteria
 4  Data Class                - Specify Data Set Allocation Parameters
 5  Storage Class             - Specify Data Set Performance and Availability
 6  Storage Group             - Specify Volume Names and Free Space Thresholds
 7  Automatic Class Selection - Specify ACS Routines and Test Criteria
 8  Control Data Set          - Specify System Names and Default Criteria
 9  Aggregate Group           - Specify Data Set Recovery Parameters
10  Library Management        - Specify Library and Drive Configurations
11  Enhanced ACS Management   - Perform Enhanced Test/Configuration Management
 C  Data Collection           - Process Data Collection Function
 L  List                      - Perform Functions Against Saved ISMF Lists
 R  Removable Media manager   - Perform Functions Against Removable Media
 X  Exit                      - Terminate ISMF

Use HELP Command for Help; Use END Command or X to Exit.
```

Figure 40. ISMF Primary Option Menu Panel

When you select option 10, Library Management, the Library Management
Selection Menu is displayed, as shown in Figure 41.

Note: Since this manual deals with OAM's relationship with tape libraries, only the
tape option is discussed. For more information on OAM's role with optical
libraries, refer to *OS/390 DFSMS OAM Planning, Installation, and Storage
Administration Guide for Object Support*.

```
   Panel  Help
--------------------------------------------------------------------------
                     LIBRARY MANAGEMENT SELECTION MENU
Enter Selection or Command ===>  __

 1  Optical Library         - Optical Library Configuration
 2  Optical Drive           - Optical Drive Configuration
 3  Tape Library            - Tape Library Configuration

















Use HELP Command for Help; Use END Command to Exit.
```

Figure 41. Library Management Selection Menu Panel

Selecting option 3, Tape Library, and hitting ENTER displays the Tape Library
Application Selection panel (see Figure 42).

Note: For example purposes, a CDS name of SCDS.TEMP.PRIMARY, and library
names of LIB1 and LIB2 are used in the panels in this appendix.

```
   Panel  Utilities  Help
 --------------------------------------------------------------------------
                     TAPE LIBRARY APPLICATION SELECTION
 Command ===>_

 To Perform Library Operations, Specify:

   CDS Name . . . . . . . 'SCDS.TEMP.PRIMARY'
                               (1 to 44 character data set name or 'ACTIVE')
   Library Name . . . . . LIB1   (For Tape Library List, fully or
                                   Partially Specified or * for all)

 Select one of the following options:
   3  1. LIST    - Generate a list of Libraries
      2. DISPLAY - Display a Library
      3. DEFINE  - Define a Library
      4. ALTER   - Alter a Library

 If List option is chosen,
    Enter "/" to selection option  _ Respecify View Criteria
                                    _ Respecify Sort Criteria

 Use ENTER Command to Perform Selection;
 Use HELP Command for Help; Use END Command to Exit.
```

Figure 42. Tape Library Application Selection Panel

To begin the library definition process:
1. Enter a CDS NAME.
2. Enter a LIBRARY NAME.
3. Select option 3, DEFINE.

Notes:

1. The letter **V** is reserved exclusively as the first character in a VOLCAT volume
   serial number. It readily identifies the volume serial number as belonging to a
   VOLCAT. To avoid confusion with the VOLCAT naming conventions, the letter **V**
   is restricted from being used as the first character of a tape library name. Any
   other character is valid.

2. After the first library definition, ISMF primes CDS NAME and LIBRARY NAME
   with the last used reference values on the Tape Library Application Selection
   panel. The default CDS NAME is the single-quoted word 'ACTIVE', which
   represents the currently active configuration.

Choosing option 3, DEFINE, displays the TAPE LIBRARY DEFINE panel with all the
input fields set to blank. You can enter a definition for LIB1, as shown in the sample
Figure 43 on page 248.

```
   Panel  Utilities  Scroll  Help
 ----------------------------------------------------------------------------
                           TAPE LIBRARY DEFINE                Page 1 of 2
 Command ===>_

 SCDS Name  . : SCDS.TEMP.PRIMARY
 Library Name : LIB1

 To Define Library, Specify:
   Description ===> Automated tape library 0001C in
               ===> building 031

   Library ID . . . . . . . . . . . 0001C      (00001 to FFFFF)
   Console Name . . . . . . . . . . LIB1CON
   Entry Default Data Class . . . . DCATLDS
   Entry Default Use Attribute  . . P          (P=PRIVATE or S=SCRATCH)
   Eject Default  . . . . . . . . . K          (P=PURGE or K=KEEP)

   Media Type:          Scratch Threshold
     Media1  . . . . 100           Media3  . . . . 100     (0 to 999999)
     Media2  . . . . 150           Media4  . . . . 0       (0 t0 999999)

 Use ENTER to Perform Verification; Use DOWN Command to View Next Panel;
 Use HELP Command for Help; Use END Command to Save and Exit; CANCEL to Exit.
```

Figure 43. Tape Library Define Panel (Page 1 of 2)

SCDS NAME and **LIBRARY NAME** are output fields that contain the SCDS and
library name you specified in the Tape Library Management Application Selection
panel.

Specify the following information for the tape library definition in the tape
configuration database and in the current source control data set.

DESCRIPTION
> A 120-byte field used for entering a description of the library definition.
> There are no restrictions on its content.

LIBRARY ID
> Specifies the hardware ID associated with the tape library being defined. A
> valid value is entered as five hexadecimal digits. This is the value returned
> by the control unit in response to a Read Device Characteristics command;
> it is defined by the customer engineer at the time of the library installation.
> Valid values are 00001–FFFFF; a default value of 00000 is not allowed.

CONSOLE NAME
> Specifies the name of the MVS console associated with the tape library
> being defined. The console name provides precise routing of console
> messages pertaining to a specific library. When the console name is not
> specified on the Tape Library Define panel, console name routing support is
> not provided. The console name is passed to the installation exits for their
> use. To use console name message routing, the console name defined on
> this panel must also be defined in the CONSOLxx member of the PARMLIB
> (see the discussion on page 50 for more information on this PARMLIB
> member). A valid value is entered as two to eight characters. Valid
> characters are alphanumeric, #, @, or $; the first character must be
> nonnumeric.

ENTRY DEFAULT DATA CLASS
> Specifies the data class to be used to determine the interchange attributes
> for private volumes entered into the tape library. No other attributes of the

data class are used. You can use the cartridge entry installation exit (CBRUXENT) to assign appropriate interchange values that override the default data class specifications.

ENTRY DEFAULT USE ATTRIBUTE

Specifies the default volume use attribute for the cartridges entered into the library being defined.

P   Indicates PRIVATE for the entry default use attribute. These tape cartridges can be used to satisfy specific volume requests.

S   Indicates SCRATCH for the entry default use attribute. These tape cartridges can be used to satisfy nonspecific volume requests.

EJECT DEFAULT

Specifies the default action for the TCDB volume record when a tape cartridge is ejected from the library being defined.

P   Indicates PURGE for the eject default parameter. The volume record is deleted from the TCDB.

K   Indicates KEEP for the eject default parameter. The volume record is kept in the TCDB.

Note: No matter which disposition is specified, the volume record in the library manager inventory is deleted upon cartridge ejection.

SCRATCH THRESHOLD

Specify the minimum acceptable number of scratch volumes for *each* media type in the library being defined. The following are recognized media types:

MEDIA1

IBM Cartridge System Tape. The number must be in the range of 0 to 999999. The default value of this parameter is 0.

MEDIA2

IBM Enhanced Capacity Cartridge System Tape. The number must be in the range of 0 to 999999. The default value of this parameter is 0.

MEDIA3

IBM High Performance Cartridge Tape. The number must be in the range of 0 to 999999. The default value of this parameter is 0.

MEDIA4

Extended High Performance Cartridge Tape. The number must be in the range of 0 to 999999. The default value of this parameter is 0.

When the number of scratch volumes in the library falls below the scratch volume threshold for that media type, operator action message **CBR3660A** is issued requesting that scratch volumes of the required media type be entered into the library. When the number of scratch volumes exceeds twice the scratch volume threshold for that media type, the message is deleted.

Attention: It is recommended that a scratch threshold be set for *all* media types used within a tape library. If a media type is not being used, the default threshold value of zero (threshold=0) should be used.

When the first define panel is complete, use the DOWN command to display the second part of the Tape Library Define panel (Figure 44 on page 250). Continue with the definition for library LIB1 by completing part two of the Tape Library Define panel.

```
   Panel  Utilities  Scroll  Help
 ----------------------------------------------------------------------------
                            TAPE LIBRARY DEFINE                Page 2 of 2
 Command ===>

 SCDS Name  . : SCDS.TEMP.PRIMARY
 Library Name : LIB1

 Initial Online Status (Yes, No, or Blank):
 *SYSPLX01 ===> YES  *SYSPLX02 ===>      *SYSPLX03 ===> NO   *SYSPLX04 ===>
  SYSSTM01 ===> YES   SYSSTM08 ===> YES   SYSSTM15 ===>       SYSSTM22 ===>
  SYSSTM02 ===>       SYSSTM09 ===>       SYSSTM16 ===>       SYSSTM23 ===>
  SYSSTM03 ===>       SYSSTM10 ===>       SYSSTM17 ===>       SYSSTM24 ===>
  SYSSTM04 ===>       SYSSTM11 ===>       SYSSTM18 ===>       SYSSTM25 ===>
  SYSSTM05 ===>       SYSSTM12 ===>       SYSSTM19 ===>       SYSSTM26 ===>
  SYSSTM06 ===>       SYSSTM13 ===>       SYSSTM20 ===>       SYSSTM27 ===>
  SYSSTM07 ===>       SYSSTM14 ===>       SYSSTM21 ===>       SYSSTM28 ===>
 WARNING:
   When you connect a tape library to a system group rather than a system,
   you lose the ability to vary that library online or offline to the
   individual systems in the system group.  It is strongly recommended that
   the tape library be connected to individual systems only.
 Use ENTER to Perform Verification; Use UP Command to View Previous Panel;
 Use HELP Command for Help; Use END Command to Save and Exit; CANCEL to Exit.
```

Figure 44. Tape Library Define Panel (Page 2 of 2)

Note: You can exit the Tape Library Define panel at any time without saving tape library attributes by issuing the CANCEL command.

Specify the following information on this panel:

INITIAL ONLINE STATUS
Specifies how the library being defined will be associated to each system or system group in the SMS complex each time this SCDS is activated. The following are valid values:
- Online (YES)
- Offline (NO)
- Not connected (blank)

A tape library can be connected to any combination of one or more of the systems or system groups defined in the CDS base, but it is strongly recommended that the tape libraries be connected to systems rather than system groups. When a tape library is connected to a system group, the user loses the ability to vary the tape library online or offline to the individual systems in the system group. The ISMF Tape Library panels support both system names and system group names.

The system administrator defining the libraries does not need to be logged on to one of the systems in the SMS complex to define the libraries in that complex—both the TCDB and the SCDS can be moved after being created. However, both the SCDS and the TCDB for the SMS complex being defined must be available to the system administrator during the library definition process.

The definition for the tape library does not take affect until the SCDS to which it is defined is activated. Once the library is defined within the SCDS and the record for the library is updated in the TCDB, the attributes assigned to the last defined library for the SCDS are displayed on the Tape Library Application Selection menu and the Tape Library Define panel as defaults. These values can be modified to define other libraries as needed.

After you complete the definition of LIB1, the Tape Library Application Selection menu (Figure 42 on page 247) is displayed again, and you can define your second tape library as follows:
1. Enter a LIBRARY NAME (LIB2)
2. Press ENTER

Note: Since LIB1 was the last library defined, the SCDS to which it belongs is primed to display in the SCDS NAME field on this panel (assuming the SCDS was reactivated since the definition of LIB1). If you wish to change the SCDS NAME, you may do so here; otherwise, the library (LIB2) that is currently being defined will reside in the same SCDS as LIB1.

The Tape Library Define panel (Figure 45 and Figure 46 on page 252) are again displayed, and you enter the appropriate information for LIB2.

```
   Panel  Utilities  Scroll  Help
 ----------------------------------------------------------------------------
                           TAPE LIBRARY DEFINE                 Page 1 of 2
 Command ===>_

 SCDS Name  . : SCDS.TEMP.PRIMARY
 Library Name : LIB2

 To Define Library, Specify:
   Description ===> Manual tape library 0002C in
              ===> building 021

   Library ID . . . . . . . . . . . 0002C      (00001 to FFFFF)
   Console Name . . . . . . . . . . LIB2CON
   Entry Default Data Class . . . . DCMTLDS
   Entry Default Use Attribute  . . P          (P=PRIVATE or S=SCRATCH)
   Eject Default  . . . . . . . . . K          (P=PURGE or K=KEEP)

   Media Type:         Scratch Threshold
     Media1  . . . . 100        Media3  . . . .  0    (0 to 999999)
     Media2  . . . . 150        Media4  . . . .  0    (0 TO 999999)

 Use ENTER to Perform Verification; Use DOWN Command to View Next Panel;
 Use HELP Command for Help; Use END Command to Save and Exit; Cancel To Exit.
```

Figure 45. Tape Library Define Panel (Page 1 of 2)

```
   Panel  Utilities  Scroll  Help
 --------------------------------------------------------------------------
                            TAPE LIBRARY DEFINE              Page 2 of 2
 Command ===>

 SCDS Name  . : SCDS.TEMP.PRIMARY
 Library Name : LIB2

 Initial Online Status (Yes, No, or Blank):
 *SYSPLX01 ===>       *SYSPLX02 ===>      *SYSPLX03 ===>       *SYSPLX04 ===>
  SYSSTM01 ===> YES    SYSSTM08 ===>       SYSSTM15 ===>        SYSSTM22 ===>
  SYSSTM02 ===>        SYSSTM09 ===>       SYSSTM16 ===>        SYSSTM23 ===>
  SYSSTM03 ===>        SYSSTM10 ===>       SYSSTM17 ===>        SYSSTM24 ===>
  SYSSTM04 ===> YES    SYSSTM11 ===>       SYSSTM18 ===>        SYSSTM25 ===>
  SYSSTM05 ===>        SYSSTM12 ===>       SYSSTM19 ===>        SYSSTM26 ===>
  SYSSTM06 ===>        SYSSTM13 ===>       SYSSTM20 ===>        SYSSTM27 ===>
  SYSSTM07 ===>        SYSSTM14 ===>       SYSSTM21 ===>        SYSSTM28 ===>
 WARNING:
 When you connect a tape library to a system group rather than a system,
 you lose the ability to vary that library online or offline to the
 individual systems in the system group.  It is strongly recommended that
 the tape library be connected to individual systems only.
 Use ENTER to Perform Verification; Use UP Command to View Previous Panel;
 Use HELP Command for Help; Use END Command to Save and Exit; CANCEL to Exit.
```

Figure 46. Tape Library Define Panel (Page 2 of 2)

After completing these library definitions, you have two libraries—one ATLDS library, LIB1, along with an MTLDS library, LIB2—defined in the SMS configuration. Defining a tape library using the Tape Library Define panels adds a library record to the TCDB along with the library definition into the specified SCDS.

Displaying Tape Library Attributes

A storage administrator can display the attributes of a tape library dataserver by:
1. Select option 2, DISPLAY, on the Tape Library Application Selection panel (Figure 42 on page 247).
2. Press ENTER.

Figure 47 on page 253 shows the first of the two TAPE LIBRARY DISPLAY panels that are displayed.

```
   Panel  Utilities  Scroll  Help
 --------------------------------------------------------------------------
                           TAPE LIBRARY DISPLAY              Page 1 of 2
 Command ===>_

 CDS Name . . . : SCDS.TEMP.PRIMARY
 Library Name . :LIB1
 Library Type . :AUTOMATED
 Device Type  . :3495-L50
 Library ID . . :0001C
 Description  . :Automated tape library 0001C in building 031


 Console Name   . . . . . . . :LIB1CON
 Entry Default Data Class  . :DCATLDS
 Entry Default Use Attribute :PRIVATE
 Eject Default . . . . . . . :KEEP

 Media Type:          Media1   Media2   Media3   Media4
 Scratch Threshold:     100      150      100       0
 Scratch Number:       1250      725     1100       0

 Use DOWN Command to View Next Panel;
 Use HELP Command for Help; Use END Command to Exit.
```

Figure 47. Tape Library Display Panel (Page 1 of 2)

The following fields are displayed:

CDS NAME

> The name of the control data set to which this library is associated.

LIBRARY NAME

> The name you specified in the library definition on the Tape Library
> Management Application Selection panel.

LIBRARY TYPE

> The type of library. Valid types are: AUTOMATED and MANUAL.

DEVICE TYPE

> The device type associated with the library. Valid device types are:
> - 3494-L10, 3495-L20, 3495-L30, 3495-L40, 3495-L50 (ATLDSs)
> - 3495-M10 (MTLDS)
> - -------- the value is not available.
> - ???????? the value cannot be displayed due to an error.

LIBRARY ID

> The hardware ID associated with the tape library being defined. A valid
> value is entered as five hexadecimal digits. This is the value returned by the
> control unit in response to a Read Device Characteristics command; it is
> defined by the customer engineer at the time of the library installation. Valid
> values are 00001–FFFFF; a default value of 00000 is not allowed.

DESCRIPTION

> This is a 120-byte field that the installation uses to describe the library.
> There are no restrictions on its content.

CONSOLE NAME

> The name of the MVS console associated with the tape library being
> defined. The console name provides for precise routing of console
> messages pertaining to a specific library. When the console name is not
> specified, console name routing support is not provided. The console name
> is passed to the installation exits for their use.

ENTRY DEFAULT DATA CLASS

Specifies the data class to be used to determine the interchange attributes for private volumes entered into the tape library. No other attributes of the data class are used. You can use the cartridge entry installation exit (CBRUXENT) to assign appropriate interchange values that override the default data class specifications.

ENTRY DEFAULT USE ATTRIBUTE

The default volume use attribute for the cartridges entered into the library.

PRIVATE

These tape cartridges can be used to satisfy specific volume requests.

SCRATCH

These tape cartridges can be used to satisfy nonspecific volume requests.

EJECT DEFAULT

The default action for the TCDB volume record when a tape cartridge is ejected from the library being defined.

PURGE

The volume record is deleted from the TCDB.

KEEP The volume record is kept in the TCDB.

Note: No matter which disposition is specified, the volume record in the library manager inventory is deleted upon cartridge ejection.

MEDIA TYPE

The following are recognized media types:

MEDIA1

IBM Cartridge System Tape

MEDIA2

IBM Enhanced Capacity Cartridge System Tape

MEDIA3

IBM High Performance Cartridge Tape

MEDIA4

IBM Extended High Performance Cartridge Tape

SCRATCH THRESHOLD

The minimum acceptable number of scratch volumes for each media type in the library.

SCRATCH NUMBER

The number of tape cartridges available to satisfy nonspecific volume requests.

Figure 48 on page 255 shows the second part of the Tape Library Display panel.

```
   Panel  Utilities  Scroll  Help
  ----------------------------------------------------------------------------
                              TAPE LIBRARY DISPLAY              Page 2 of 2
  Command ===>

  CDS Name . . . :SCDS.TEMP.PRIMARY
  Library Name . :LIB1
  Library Type . :AUTOMATED
  Device Type  . :3495-L50
  Library ID . . :0001C

  Number of Slots  . :16260
  Empty Slots  . . . :2050
  Initial Online Status :
   *SYSPLX01:      *SYSPLX02:      *SYSPLX03:      *SYSPLX04:
    SYSSTM01:YES    SYSSTM08:       SYSSTM15:       SYSSTM22:
    SYSSTM02:       SYSSTM09:       SYSSTM16:       SYSSTM23:
    SYSSTM03:       SYSSTM10:       SYSSTM17:       SYSSTM24:
    SYSSTM04:YES    SYSSTM11:       SYSSTM18:       SYSSTM25:
    SYSSTM05:       SYSSTM12:       SYSSTM19:       SYSSTM26:
    SYSSTM06:       SYSSTM13:       SYSSTM20:       SYSSTM27:
    SYSSTM07:       SYSSTM14:       SYSSTM21:       SYSSTM28:
  Use UP Command to View Previous Panel;
  Use HELP Command for Help; Use END Command to Exit.
```

Figure 48. Tape Library Display Panel (Page 2 of 2)

The following fields are displayed:

NUMBER OF SLOTS
> The number of tape cartridge slots within the tape library.

EMPTY SLOTS
> The number of tape cartridge slots that are empty and available within the tape library.

INITIAL ONLINE STATUS
> The status of whether this tape library should be:
> - Online (YES)
> - Offline (NO)
> - Not connected (blank)
>
> to each system or system group in the SMS complex when the SCDS is activated. As the online/offline status is changed with the SMS VARY, LIBRARY command, the current status is maintained in the ACDS but not in the base SCDS. Thus, the status values in the base SCDS may not be current.
>
> The system and system group names shown are the actual names taken from the base configuration record of the CDS. The number of system and system group names shown can vary between one and thirty-two. The display shows the difference between system names and system group names by preceding each system group name by an asterisk.

Redefining a Tape Library

The storage administrator can redefine a tape library by specifying a tape library that has a record in the TCDB, but no corresponding library definition in this SCDS. The Tape Library Redefine panels (Figure 49 on page 256, Figure 50 on page 256, Figure 51 on page 257, and Figure 52 on page 257) are displayed when the storage administrator selects option 3, DEFINE, on the Tape Library Application Selection panel, and there is already a tape library record for this library name in the TCDB.

The library is redefined since most of the information describing the library already resides in the TCDB and does not have to be re-entered.

When the redefine panel is first shown, message DGTLM020—ATTRIBUTES PRIMED appears to emphasize that a redefine is taking place. When END is pressed, a record is added to the new SCDS. The TCDB is updated only if one of the relevant fields on a redefine panel is changed. The changes are not effective until the updated SCDS is activated.

```
   Panel  Utilities  Scroll  Help
  -----------------------------------------------------------------------------
                            TAPE LIBRARY REDEFINE            ATTRIBUTES PRIMED
  Command ===>_

  SCDS Name  . :SCDS.TEMP2.PRIMARY
  Library Name :LIB1
  Library Type :AUTOMATED
  Device Type  :3495-L50

  To Redefine Library, Specify:
    Description ===> Automated tape library 0001C in
                ===> building 031

    Library ID . . . . . . . . . . . 0001C      (00001 to FFFFF)
    Console Name . . . . . . . . . . LIB1CON
    Entry Default Data class . . . .
    Entry Default Use Attribute  . . P          (P=PRIVATE or S=SCRATCH)
    Eject Default  . . . . . . . . . K          (P=PURGE or K=KEEP)



  Use ENTER to Perform Verification; Use DOWN Command to View Next Panel;
  Use HELP Command for Help; Use END Command to Save and Exit; CANCEL to Exit.
```

Figure 49. Tape Library Redefine Panel (Page 1 of 4)

```
   Panel  Utilities  Scroll  Help
  -----------------------------------------------------------------------------
                            TAPE LIBRARY REDEFINE            ATTRIBUTES PRIMED
  Command ===>_

  SCDS Name  . :SCDS.TEMP2.PRIMARY
  Library Name :LIB1
  Library Type :AUTOMATED
  Device Type  :3495-L50


  Media Type:                Scratch Threshold             Scratch Number
    Media1  . . . . . . . . . . . 100       (0 to 999999)        1250
    Media2  . . . . . . . . . . . 150       (0 to 999999)        725
    Media3  . . . . . . . . . . . 100       (0 to 999999)        1100
    Media4  . . . . . . . . . . . 0         (0 to 999999)        0




  Use ENTER to Perform Verification; Use DOWN Command to View Next Panel;
  Use HELP Command for Help; Use END Command to Save and Exit; CANCEL to Exit.
```

Figure 50. Tape Library Redefine Panel (Page 2 of 4)

```
   Panel  Utilities  Scroll  Help
  --------------------------------------------------------------------------
                        TAPE LIBRARY REDEFINE          ATTRIBUTES PRIMED
  Command ===>

  SCDS Name  . . . :SCDS.TEMP2.PRIMARY
  Library Name . . :LIB1
  Library Type . . :AUTOMATED              * SYS GROUP= Sysplex minus systems in
  Device Type  . . :3495-L50                 sysplex explicitly defined SCDS
  Library ID . . . :0001C
  Number of Slots  :16260                   Empty Slots . . :2050
    Initial Online Status (Yes, No, or Blank):
  *SYSPLX01 ===>      *SYSPLX02 ===>      *SYSPLX03 ===>      *SYSPLX04 ===>
   SYSSTM01 ===> YES   SYSSTM04 ===> YES   SYSSTM07 ===>       SYSSTM10 ===>
   SYSSTM02 ===>       SYSSTM05 ===>       SYSSTM08 ===>       SYSSTM11 ===>
   SYSSTM03 ===>       SYSSTM06 ===>       SYSSTM09 ===>       SYSSTM12 ===>

  WARNING:
    When you connect a tape library to a system group rather than a system,
    you lose the ability to vary that library online or offline to the
    individual systems in the system group.  It is strongly recommended that
    the tape library be connected to individual systems only.
  Use ENTER to Perform Verification; Use UP/DOWN Command to View Other Panels;
  Use HELP Command for Help; Use END Command to Save and Exit; CANCEL to Exit.
```

Figure 51. Tape Library Redefine Panel (Page 3 of 4)

```
   Panel  Utilities  Scroll  Help
  --------------------------------------------------------------------------
                        TAPE LIBRARY REDEFINE          ATTRIBUTES PRIMED
  Command ===>

  SCDS Name . . :SCDS.TEMP2.PRIMARY
  Library Name  :LIB1
  Library Type  :AUTOMATED                 * SYS GROUP = Sysplex minus systems in
  Device Type . :3495-L50                    sysplex explicitly defined in SCDS.
  Library ID  . :0001C
  Number of Slots :16260                    Empty Slots  . :2050
    Initial Online Status (Yes, No, or Blank):
   SYSSTM13 ===> YES   SYSSTM17 ===> YES   SYSSTM21 ===>       SYSSTM25 ===>
   SYSSTM14 ===>       SYSSTM18 ===>       SYSSTM22 ===>       SYSSTM26 ===>
   SYSSTM15 ===>       SYSSTM19 ===>       SYSSTM23 ===>       SYSSTM27 ===>
   SYSSTM16 ===>       SYSSTM20 ===>       SYSSTM24 ===>       SYSSTM28 ===>

  WARNING:
    When you connect a tape library to a system group rather than a system,
    you lose the ability to vary that library online or offline to the
    individual systems in the system group.  It is strongly recommended that
    the tape library be connected to individual systems only.
  Use ENTER to Perform Verification; Use UP Command to View Previous Panel;
  Use HELP Command for Help; Use END Command to Save and Exit; CANCEL to Exit.
```

Figure 52. Tape Library Redefine Panel (Page 4 of 4)

The following fields are primed from the TCDB when the Tape Library Redefine
panels are displayed:
• DESCRIPTION
• LIBRARY ID
• CONSOLE NAME
• SCRATCH THRESHOLD

The following fields are maintained in the SCDS and not in the TCDB. Since there is no SCDS definition to supply these values for redefine, the redefine panel displays the following primed values:
- ENTRY DEFAULT DATA CLASS (blanks)
- ENTRY DEFAULT USE ATTRIBUTE (PRIVATE)
- EJECT DEFAULT (KEEP)
- INITIAL ONLINE STATUS
  - NO for the system the user is logged on to (if that system is included in this SCDS)
  - blanks for all other systems

Note: If identical values in different CDSs are needed, the COPY line operator on the TAPE LIBRARY LIST panel should be used.

Altering a Tape Library

The Tape Library Alter panels are displayed when a storage administrator selects option 4, ALTER, on the Tape Library Application Selection panel or enters the alter line operator on the Tape Library List panel (see Figure 66 on page 272 through Figure 69 on page 273).

You can use the Tape Library Alter option to alter the attributes of an existing tape library. Altering a library results in updating the library definition within the specified SCDS and the attributes stored in the TCDB.

You can alter the tape library, LIB1, to change its definition in the tape configuration database by using the Tape Library Alter panel. To alter the tape library, start from the Tape Library Application Selection panel, shown in Figure 42 on page 247:
1. Specify the name of the SCDS containing the tape library you want to change (SCDS.TEMP.PRIMARY).
2. Specify the tape library name (LIB1).
3. Select option 4, ALTER.

ISMF displays the Tape Library Alter panels shown in Figure 53 on page 259, Figure 54 on page 259, Figure 55 on page 260, and Figure 56 on page 260.

```
   Panel  Utilities  Scroll  Help
 -----------------------------------------------------------------------------
                            TAPE LIBRARY ALTER                  Page 1 of 4
 Command ===>_

 SCDS Name  . :SCDS.TEMP.PRIMARY
 Library Name :LIB1
 Library Type :AUTOMATED
 Device Type  :3495-L50

 To ALTER Library, Specify:
   Description ===> Automated tape library 0001C in
              ===> building 031

   Library ID . . . . . . . . . . . 0001C      (00001 to FFFFF)
   Console Name . . . . . . . . . . LIB1CON
   Entry Default Data Class . . . . DCATLDS
   Entry Default Use Attribute  . . P          (P=PRIVATE or S=SCRATCH)
   Eject Default  . . . . . . . . . K          (P=PURGE or K=KEEP)



 Use ENTER to Perform Verification; Use DOWN Command to View Next Panel;
 Use HELP Command for Help; Use END Command to Save and Exit; CANCEL to Exit.
```

Figure 53. Tape Library Alter Panel (Page 1 of 4)

```
   Panel  Utilities  Scroll  Help
 -----------------------------------------------------------------------------
                            TAPE LIBRARY ALTER                  Page 2 of 4
 Command ===>_

 SCDS Name  . :SCDS.TEMP.PRIMARY
 Library Name :LIB1
 Library Type :AUTOMATED
 Device Type  :3495-L50


 Media Type:              Scratch Threshold            Scratch Number
   Media1  . . . . . . . . . . 100      (0 to 999999)       1250
   Media2  . . . . . . . . . . 150      (0 to 999999)       725
   Media3  . . . . . . . . . . 100      (0 to 999999)       1100
   Media4  . . . . . . . . . . 0        (0 to 999999)       0





 Use ENTER to Perform Verification; Use DOWN Command to View Next Panel;
 Use HELP Command for Help; Use END Command to Save and Exit; CANCEL to Exit.
```

Figure 54. Tape Library Alter Panel (Page 2 of 4)

```
   Panel  Utilities  Scroll  Help
 ---------------------------------------------------------------------------
                            TAPE LIBRARY ALTER               Page 3 of 4
 Command ===>

 SCDS Name  . . . :SCDS.TEMP.PRIMARY
 Library Name . . :LIB1
 Library Type . . :AUTOMATED              * SYS GROUP = Sysplex minus systems in
 Device Type  . . :3495-L50                 sysplex explicitly defined SCDS
 Library ID . . . :0001C
 Number of Slots  :16260                  Empty Slots  . . :2050

   Initial Online Status (Yes, No, or Blank):
    *SYSPLX01 ===>      *SYSPLX02 ===>      *SYSPLX03 ===>      *SYSPLX04 ===>
     SYSSTM01 ===> YES   SYSSTM04 ===> YES   SYSSTM07 ===>       SYSSTM10 ===>
     SYSSTM02 ===>       SYSSTM05 ===>       SYSSTM08 ===>       SYSSTM11 ===>
     SYSSTM03 ===>       SYSSTM06 ===>       SYSSTM09 ===>       SYSSTM12 ===>
WARNING:
  When you connect a tape library to a system group rather than a system,
  you lose the ability to vary that library online or offline to the
  individual systems in the system group.  It is strongly recommended that
  the tape library be connected to individual systems only.
Use ENTER to Perform Verification; Use UP/DOWN Command to View Other Panels;
Use HELP Command for Help; Use END Command to Save and Exit; CANCEL to Exit.
```

Figure 55. Tape Library Alter Panel (Page 3 of 4)

```
   Panel  Utilities  Scroll  Help
 ---------------------------------------------------------------------------
                            TAPE LIBRARY ALTER               Page 4 of 4
 Command ===>

 SCDS Name . . :SCDS.TEMP.PRIMARY
 Library Name  :LIB1
 Library Type  :AUTOMATED                 * SYS GROUP = Sysplex minus systems in
 Device Type . :3495-L50                    sysplex explicitly defined in SCDS
 Library ID  . : 0001C
 Number of Slots :16260                   Empty Slots:     2050
   Initial Online Status (Yes, No, or Blank):
  SYSSTM13 ===> YES   SYSSTM17 ===> YES   SYSSTM21 ===>       SYSSTM25 ===>
  SYSSTM14 ===>       SYSSTM18 ===>       SYSSTM22 ===>       SYSSTM26 ===>
  SYSSTM15 ===>       SYSSTM19 ===>       SYSSTM23 ===>       SYSSTM27 ===>
  SYSSTM16 ===>       SYSSTM20 ===>       SYSSTM24 ===>       SYSSTM28 ===>

WARNING:
  When you connect a tape library to a system group rather than a system,
  you lose the ability to vary that library online or offline to the
  individual systems in the system group.  It is strongly recommended that
  the tape library be connected to individual systems only.

Use ENTER to Perform Verification; Use UP Command to View Previous Panel;
Use HELP Command for Help; Use END Command to Save and Exit; CANCEL to Exit.
```

Figure 56. Tape Library Alter Panel (Page 4 of 4)

The following fields can be altered:
- DESCRIPTION
- LIBRARY ID
- CONSOLE NAME
- ENTRY DEFAULT DATA CLASS
- ENTRY DEFAULT USE ATTRIBUTE
- EJECT DEFAULT
- INITIAL ONLINE STATUS

Copying Tape Library Definitions

You can copy existing tape library definitions and modify them to create new tape library definitions through the use of two methods.

One method is to use the attributes assigned to the last tape library defined. These fields are primed by ISMF from the last library definition. You can simply modify the attributes to define a new tape library and the new tape library is added to the SCDS and the tape configuration database.

Another method of copying existing tape library definitions to create new tape library definitions is to use the COPY line operator from the Tape Library List panel (see Figure 66 on page 272 through Figure 69 on page 273). You simply enter the COPY line operator in the LINE OPERATOR column next to the tape library you wish to copy. Press ENTER to copy the existing tape library attributes and the COPY ENTRY panel is displayed (see Figure 57).

```
   Panel  Utilities  Help
 --------------------------------------------------------------------------
                         COPY ENTRY PANEL

 Command ===>

   Definition will be copied from:

     Data Set Name . :'SCDS.TEMP.PRIMARY'
     Definition Name : LIB1
     Definition Type : TAPE LIBRARY

   Specify "Copy To" Definition:

     Data Set Name . .   'SCDS.TEMP2.PRIMARY'
                               (1 to 46 characters)

     Definition Name . .          (1 to 8 characters, fully specified)

     Enter "/" to select option  _ Perform Alter


  Use ENTER to Perform Copy;
  Use HELP Command for Help; Use END Command to Exit.
```

Figure 57. Copy Entry Panel

Identifying the From and To Sources for Copying

The *from* DATA SET NAME field identifies the source that you are copying. It is primed with the value you specified on the Tape Library Application Selection panel. The *from* DEFINITION NAME field identifies the name of the tape library that you are copying. This field is primed with the value from the LIBRARY NAME field of the Tape Library List panel.

The *to* DATA SET NAME field identifies the target SCDS of the copy. It must be a name of an SCDS. It is primed with the value of the *from* DATA SET NAME if the *from* DATA SET NAME contains an SCDS name. It is primed with blanks if the *from* DATA SET NAME is 'ACTIVE'. The *to* DEFINITION NAME field identifies the name of the tape library you wish to define. It is primed with blanks.

In the PERFORM ALTER field, you indicate if you want to change some of the attributes of the copy you are creating. If you specify **Y** for yes, you go to the pertinent Alter panel. If you specify **N** for no, you remain on the COPY ENTRY PANEL, where you can perform another copy or return to the original library list panel.

When copying a tape library definition from one SCDS into another SCDS, you do not need to select the PERFORM ALTER option. In the case where a tape library definition is copied within the same SCDS, you must choose the PERFORM ALTER option because tape libraries in the same SCDS must differ from one definition to another.

When you have specified the values, press ENTER to perform the copy.

Deleting a Tape Library Definition

Deleting a tape library definition removes the definition for that tape library from the specified SCDS and, upon activation of that SCDS, the tape library data server is unavailable to the system. Deleting a tape library dataserver has no effect on the TCDB because there may be other SCDSs that still contain the tape library data server. In order to delete a tape library from the TCDB, IDCAMS with the DELETE LIBENTRY parameters must be used.

As part of the tape library definition deletion, all storage group constructs in the SCDS that are defined as including the library undergoing deletion are updated to remove that library from the storage group definition. When the last library is deleted from a tape storage group, the invalid tape storage group definition remains in the SCDS. The SCDS will not validate until all invalid tape storage group definitions are either deleted or altered so that they contain at least one tape library.

From the Tape Library List panel (see Figure 66 on page 272 through Figure 69 on page 273):
1. Enter DELETE in the LINE OPERATOR column next to the tape library you wish to delete.
2. Press ENTER.

   The Confirm Delete Request panel, Figure 58 on page 263, is displayed.

```
   Panel  Utilities  Help
 ------------------------------------------------------------------------------
                             CONFIRM DELETE REQUEST
 Command ===>

   To Confirm Deletion on the following Tape Library:

      Tape Library Name  :LIB1
      Residing in SCDS . :'SCDS.TEMP.PRIMARY'


   Specify the following:
      Enter "/" to select option    _ Perform Deletion








 Use ENTER to Perform Operation;
 Use HELP Command for Help; Use END Command to Exit.
```

Figure 58. Confirm Delete Request Panel

3. Confirm that the displayed library is the one that you want to delete. If it is, enter **Y** for yes, or **N** for no.
4. Press ENTER.

The Tape Library List appears with '*DELETE' in the LINE OPERATOR column next to the deleted library.

Monitoring and Maintaining Tape Volumes

The ISMF Volume function assists in the maintenance and verification of the tape volumes within the automated and manual tape library dataserver through the use of the Mountable Tape Volume Application available from the Tape Library application Selection panel.

Using the Mountable Tape Volume Application, storage administrators can use line operators or ISMF commands to perform inventory tasks against tape libraries and the library-resident volumes residing in them. These functions can be performed using the Mountable Tape Volume Application:
- **AUDIT** a volume, a list of volumes, or a tape library.
- **ALTER** the use attribute, storage group, shelf location, or owner information of a volume or list of volumes.
- **EJECT** a single tape volume (for information on using the EJECT line operator, refer to "Ejecting a Volume from a Tape Library" on page 283).

ISMF Mountable Tape Volume Application

The ISMF Mountable Tape Volume Application allows you to create, save, and restore lists of tape cartridge volumes. A selection panel allows you to generate a list based on any combination of the following criteria (wildcards are supported):
- A fully or partially specified volume serial number
- A fully or partially specified storage group name
- A fully or partially specified tape library name

You can use the **View**, **Sort**, and **Hide** functions to further customize your volume lists.

Note: If the TCDB is being shared across multiple OS/390 system levels, volume levels containing TDSI information that is not understood by the level of the software on the system will not be displayed when a volume list is requested from ISMF. This prevents the OS/390 system from processing volume records containing TDSI information that is not understood by the system.

Generating a Mountable Tape Volume List

There are actually two options available from the ISMF Primary Option menu that can be used to assist you in generating a Mountable Tape Volume List. Both approaches are discussed in the following information.

Follow these steps to display the Mountable Tape Volume Selection Entry panel using the Library Management option of the ISMF Primary Option Menu.

1. Select option 10, Library Management, from the ISMF Primary Option Menu (see Figure 40 on page 246). ISMF displays the Library Management Selection menu (see Figure 41 on page 246).

2. Select option 3, TAPE LIBRARY. This in turn, displays the Tape Library Application Selection panel (Figure 42 on page 247).

   Note: Depending on the information provided on this screen, selecting option 1, LIST, and pressing ENTER can either display a list that includes a single library, a fully or partially specified library, or a list of all the libraries associated with the SCDS primed on the Tape Library Application Selection panel.

3. When the library list is displayed, type the line operator command LISTVOL next to the library name or names for which you need a volume listing.

Follow these steps to bring up the Mountable Tape Volume Selection Entry panel from the VOLUME option of the ISMF Primary Option Menu.

1. Select option 2, VOLUME, from the ISMF Primary Option Menu (see Figure 40 on page 246). ISMF displays the Volume List Selection Menu (see Figure 59 on page 265).

```
  Panel  Help
---------------------------------------------------------------------------
                           VOLUME LIST SELECTION MENU

Enter Selection or Command ===>


  1 DASD                    - Generate a list of DASD volumes
  2 Mountable Optical       - Generate a list of Mountable Optical volumes
  3 Mountable Tape          - Generate a list of Mountable Tape volumes














Use HELP Command for Help; Use END Command to Exit.
```

Figure 59. Volume List Selection Menu Panel

2. Select option 3, MOUNTABLE TAPE, which prompts the display of Mountable
    Tape Volume Selection Entry Panel (Figure 60).

```
  Panel  Utilities  Help
---------------------------------------------------------------------------
                  MOUNTABLE TAPE VOLUME SELECTION ENTRY PANEL
Command ===>

Select Source to Generate Volume List  . . 2    (1 - Saved list, 2 - New list)

    1  Generate from a Saved List
         List Name . .

    2  Generate a New List from Criteria Below
         Volume Serial Number . . .  *          (fully or partially specified)
         Library Name . . . . . . .  *          (fully or partially specified)
         Storage Group Name . . . .  *          (fully or partially specified)

       Enter "/" to select option   _ Respecify View Criteria
                                     _ Respecify Sort Criteria




Use ENTER to Perform Selection;
Use HELP Command for Help; Use END Command to Exit.
```

Figure 60. Mountable Tape Volume Selection Entry Panel

This panel allows you to generate a volume list.

When option 1, SAVED LIST, is selected, you enter the name of the saved list in
the **LIST NAME** field under option *1 GENERATE FROM A SAVED LIST*. A
previously saved list is displayed.

When option 2, NEW LIST, is chosen, a new list is built using the selection criteria you described in the *GENERATE A NEW LIST FROM CRITERIA BELOW* data columns. *OS/390 DFSMS: Using the Interactive Storage Management Facility* describes all the columns in the Mountable Tape Volume Selection Entry Panel. Complete the following fields for option 2 (default):

VOLUME SERIAL NUMBER

Enter a full or partial serial number of the volume or volumes to include in the list. The default value is an asterisk. The volume serial number must consist entirely of upper case alphabetics A—Z and numerics 0–9.

To include a single volume, enter a fully qualified volume serial number of 1 to 6 characters: VOLUME SERIAL NUMBER ===> **SYS001**

For a partially qualified volume serial number, use asterisks as global volume serial number characters or percent signs as place holders. For example, to include a range of volumes, enter a partially qualified volume serial number by using one or two asterisks as global volume serial number characters: VOLUME SERIAL NUMBER ===> **T*9***

Use a single asterisk to specify all mounted volumes that fit your other selection criteria: VOLUME SERIAL NUMBER ===> ***** This field is primed with the last value used. The default value is an asterisk.

LIBRARY NAME

Enter the 1 to 8 character name of a tape library, or a partially qualified name. This field is primed with the last value used. The default value is an asterisk.

STORAGE GROUP NAME

Enter the 1 to 8 character name of an SMS storage group, in the same way as you would for a volume serial number. This field is primed with the last value used. The default value is an asterisk.

RESPECIFY VIEW CRITERIA

This field is used to specify whether or not to invoke the Mountable Tape Volume View Entry panel before displaying the sort or list panel. Values are Y or N.

RESPECIFY SORT CRITERIA

This field is used to specify whether or not to invoke the Mountable Tape Volume View Sort panel before displaying the list. Values are Y or N.

Final Step: Generating the List

After entering the information you want on the Mountable Tape Volume Selection Entry panel, you are ready to generate the list. Press ENTER to display the volumes that meet your selection criteria. If you specified view or sort criteria, the VIEW or SORT panels are displayed before the volume list.

```
   Panel  List  Utilities  Scroll  Help
 -------------------------------------------------------------------------
                      MOUNTABLE TAPE VOLUME LIST
 Command ===>                                          SCROLL ===> PAGE
                                                     Entries 1-11 of 11
 Enter Line Operators Below:                         Data Columns 3-7 of 20

    LINE         VOLUME  USE      VOLUME          CHECKPT  LIBRARY  STORAGE
    OPERATOR     SERIAL  ATTR     ERROR STATUS    VOLUME   NAME     GRP NAME
    ---(1)----   -(2)--  --(3)--  -------(4)----- --(5)--  --(6)--- --(7)---
                 VOL01   PRIVATE  I/O ERROR       NO       SHELF    TAPE1
                 VOL02   SCRATCH  UNEXPIRED SCRATCH ---     SHELF    *SCRTCH*
                 VOL101  SCRATCH  NO ERROR        NO       SHELF    *SCRTCH*
                 VOL102  SCRATCH  PASSWORD CONFLICT NO      LIB1     *SCRTCH*
                 VOL103  SCRATCH  SECURITY CONFLICT NO      LIB2     *SCRTCH*
                 VOL104  PRIVATE  SCRATCH IN USE   ---      LIB2     TAPE1
                 VOL105  PRIVATE  VOLSER MISMATCH  NO       LIB1     TAPE1
                 VOL106  SCRATCH  CHCKPOINT CONFLICT YES    LIB2     *SCRTCH*
                 VOL107  SCRATCH  WRITE CONFLICT   YES      LIB1     *SCRTCH*
                 VOL108  PRIVATE  NOT IN SLOT      NO       LIB1     TAPE1
                 VOL109  PRIVATE  NO ERROR        NO       LIB1     TAPE1
  ----------  ------  ----------  BOTTOM  OF  DATA  -----  ----     -------
```

Figure 61. Mountable Tape Volume List Panel (part 1 of 5).

LINE OPERATOR
    This is the input column used to specify the line operator that is invoked against
    the volumes listed in column 2 of the same row.

VOLUME SERIAL NUMBER
    Specifies the mountable tape volume serial number.

USE ATTR
    Use characteristics of the volume:
    PRIVATE
            A tape cartridge that can only be used by referencing its serial number
            and usually contains data.
    SCRATCH
            A tape cartridge that can be used to satisfy a nonspecific mount
            request.
    ???????
            The values cannot be displayed due to an error.

VOLUME ERROR STATUS
    Shows the error status of individual tape volumes.

CHECKPT VOLUME
    Checkpoint volume indicator. Values are YES, NO, or --- (when blank).

LIBRARY NAME
    The name of the library in which the tape volume resides. SHELF is used for
    volumes outside the library.

STORAGE GRP NAME
    The storage group to which the volume is assigned, *SCRTCH*, or --------
    (when blank).

```
   Panel  List  Utilities  Scroll  Help
 ---------------------------------------------------------------------------
                        MOUNTABLE TAPE VOLUME LIST
 Command ===>                                          SCROLL ===> PAGE
                                                    Entries 1-12 of 12
 Enter Line Operators Below:                        Data Columns 8-12 of 20

    LINE       VOLUME MEDIA   RECORDING  COMPACTION SPECIAL   LAST
    OPERATOR   SERIAL TYPE    TECHNOLOGY            ATTRIBUTE WRITTEN DATE
    ---(1)---- -(2)-- --(8)-- ---(9)---- ---(10)---- --(11)--- ----(12)----
               VOL01  MEDIA1  18TRACK    YES        RDCOMPAT  1994/12/17
               VOL02  MEDIA2  36TRACK    NO         --------  1995/03/22
               VOL101 MEDIA3  128TRACK   YES        --------  1996/08/30
               VOL102 MEDIA2  36TRACK    NO         --------  1994/09/21
               VOL103 MEDIA2  36TRACK    NO         --------  1995/11/03
               VOL104 MEDIA1  18TRACK    YES        RDCOMPAT  1995/03/07
               VOL105 MEDIA3  128TRACK   YES        --------  1997/04/26
               VOL106 MEDIA1  18TRACK    NO         --------  1995/01/11
               VOL107 MEDIA2  36TRACK    YES        --------  1994/05/09
               VOL108 MEDIA1  36TRACK    YES        --------  1994/02/24
               VOL109 MEDIA3  128TRACK   YES        --------  1996/10/31
    ---------- ------ ----------- BOTTOM  OF  DATA   --------  ------------
```

Figure 62. Mountable Tape Volume List Panel (part 2 of 5).

MEDIA TYPE

This data column indicates the type of media of the volume. The valid values are:

MEDIA1

IBM Cartridge System Tape

MEDIA2

IBM Enhanced Capacity Cartridge System Tape

MEDIA3

IBM High Performance Cartridge Tape

MEDIA4

IBM Extended High Performance Cartridge Tape

RECORDING TECHNOLOGY

This data column indicates the number of recording tracks on the tape. Valid values are:

18TRACK

18-track recording technology

36TRACK

36-track recording technology

128TRACK

128-track recording technology

256TRACK

256-track recording technology

-------- Recording technology not specified

????????

Recording technology unknown

COMPACTION

This field indicates whether or not the tape data sets are compacted on this volume. Valid values are:

YES   Data sets on the tape volume are compacted.

NO   Data sets on the tape volume are not compacted.

---   The value is not specified.

???   The values cannot be displayed due to an error.

SPECIAL ATTRIBUTE

This data column indicates special attributes defined for the volume. Valid
values are:

RDCOMPAT

Read compatible, which means on subsequent allocations the system
should attempt to use read compatible devices.

-------- The value is not specified.

LAST WRITTEN DATE

The date when a data set was last opened for output on the volume in the form
of YYYY/MM/DD, where YYYY is the year, MM is the month of the year, and
DD is the day of the month.

```
  Panel  List  Utilities  Scroll  Help
 --------------------------------------------------------------------------------
                         MOUNTABLE TAPE VOLUME LIST
 Command ===>                                             SCROLL ===> PAGE
                                                       Entries 1-11 of 11
 Enter Line Operators Below:                         Data Columns 13-16 of 20

    LINE        VOLUME  LAST       LAST ENTER/  VOLUME       VOLUME
    OPERATOR    SERIAL  MOUNT DATE EJECT DATE   EXPIRE DATE  CREATE DATE
    ---(1)----  -(2)--  ---(13)--- ---(14)----  ---(15)----  ---(16)----
                VOL01   1994/12/17 1995/02/05   2050/10/31   1994/01/14
                VOL02   1995/03/22 1995/05/19   2050/10/31   1994/12/04
                VOL101  1996/08/30 1996/10/08   2050/10/31   1996/04/30
                VOL102  1994/09/21 1994/11/12   2050/10/31   1994/03/11
                VOL103  1995/11/03 1996/04/15   2050/10/31   1995/08/21
                VOL104  1995/03/07 1995/04/12   2050/10/31   1994/09/01
                VOL105  1997/01/26 1997/02/17   2050/10/31   1996/11/17
                VOL106  1995/01/11 1996/11/30   2050/10/31   1994/07/29
                VOL107  1994/05/09 1994/10/28   2050/10/31   1994/01/11
                VOL108  1994/02/24 1995/06/02   2050/10/31   1994/01/01
                VOL109  1996/10/31 1997/01/31   2050/10/31   1996/07/15
    ----------  ------  ---------- BOTTOM  OF  DATA -----    -----------
```

Figure 63. Mountable Tape Volume List Panel (part 3 of 5).

LAST MOUNT DATE

The date when the volume was last mounted and successfully opened in the
form of YYYY/MM/DD, where YYYY is the year, MM is the month of the year,
and DD is the day of the month.

LAST ENTER/EJECT DATE

The date when the tape volume was last entered into, or ejected from, a library.
If the volume location is SHELF, then the date specified is the date the volume
was ejected from the library. If the volume location is LIBRARY, then the date
specified is the date the volume was entered into the library. The form for this
date is YYYY/MM/DD, where YYYY is the year, MM is the month of the year,
and DD is the day of the month.

VOLUME EXPIRE DATE

The latest expiration date among the data sets on the volume. The form for this
date is YYYY/MM/DD, where YYYY is the year, MM is the month of the year,
and DD is the day of the month.

VOLUME CREATE DATE

The date when the volume record was created. The form for this date is
YYYY/MM/DD, where YYYY is the year, MM is the month of the year, and DD
is the day of the month.

```
  Panel  List  Utilities  Scroll  Help
 -----------------------------------------------------------------------------
                         MOUNTABLE TAPE VOLUME LIST
 Command ===>                                                 SCROLL ===> PAGE
                                                            Entries 1-11 of 11
 Enter Line Operators Below:                             Data Columns 17-19 of 20

    LINE       VOLUME  WRITE    VOLUME
   OPERATOR    SERIAL  PROTECT  LOCATION           SHELF LOCATION
  ---(1)----  -(2)--  -(17)--  --(18)--  --------------(19)--------------
              VOL01    NO       SHELF     FREE FORM LOCATION
              VOL02    ---      SHELF     SHELF LOCATION #1
              VOL101   NO       SHELF     -------------------------------
              VOL102   NO       LIBRARY   CABINET 02 SHELF 04 NUMBER 11
              VOL103   NO       LIBRARY   OFFSITE
              VOL104   ---      LIBRARY   SHELF 1
              VOL105   NO       LIBRARY   SHELF 2
              VOL106   YES      LIBRARY   -------------------------------
              VOL107   YES      LIBRARY   SHELF 3
              VOL108   NO       LIBRARY   SHELF 4
              VOL109   NO       LIBRARY   SHELF 5
  ----------  ------  ----------  BOTTOM  OF  DATA --------------------
```

Figure 64. Mountable Tape Volume List Panel (part 4 of 5).

WRITE PROTECT

The tape volume write protection status. Valid values are YES, NO, or --- (when
blank).

VOLUME LOCATION

Information concerning whether the tape volume is library- or shelf-resident.

SHELF LOCATION

Information about tape cartridge residence outside a library.

```
   Panel  List  Utilities  Scroll  Help
 ------------------------------------------------------------------------------
                         MOUNTABLE TAPE VOLUME LIST
 Command ===>                                               SCROLL ===> PAGE
                                                        Entries 1-11 of 11
 Enter Line Operators Below:                            Data Columns 20-20 of 20

      LINE       VOLUME
     OPERATOR    SERIAL                    OWNER INFORMATION
    ---(1)----   -(2)--   -------------------------(20)-------------------------
                 VOL01    THIS IS FREEFORM INFORMATION ABOUT THE OWNER OF THIS CAR
                 VOL02    THE FORMAT OF THIS COLUMN IS DETERMINED BY INSTALLATION
                 VOL101   --------------------------------------------------------
                 VOL102   --------------------------------------------------------
                 VOL103   COLUMN1...............COLUMN2.....................COLUM
                 VOL104   OWNER INFORMATION #1
                 VOL105   OWNER INFORMATION #2
                 VOL106   OWNER INFORMATION #3
                 VOL107   OWNER INFORMATION #4
                 VOL108   OWNER INFORMATION #5
                 VOL109   OWNER INFORMATION #6
    ----------   ------   -----------  BOTTOM  OF  DATA  ------------------------
```

Figure 65. Mountable Tape Volume List Panel (part 5 of 5).

OWNER INFORMATION
> Identifies the volume owner. This field only displays a maximum of 56 out of 64 characters per line on the panel.

Creating a List of Tape Libraries

Generating a tape library list allows you to audit all the volumes within the selected tape library. You may generate a library list in much the same way that the volume list is created. Follow the same directions as in "Final Step: Generating the List" on page 266 to generate the library list.

Once you have generated the library list, the tape library list panels are displayed (Figure 66 on page 272 through Figure 69 on page 273). See "Displaying Tape Library Attributes" on page 252 for descriptions of the attributes on these panels.

```
  Panel  List  Utilities  Scroll  Help
----------------------------------------------------------------------------
                            TAPE LIBRARY LIST
Command ===>                                               SCROLL ===> PAGE
                                                  Entries 1-11 of 24
                                                  Data Columns 3-7 of 22
CDS Name . :SCDS.TEMP.PRIMARY

Enter Line Operators Below:

     LINE        LIBRARY   DEVICE    LIBRARY    LIBRARY  CONSOLE   ENTRY DEF
    OPERATOR     NAME      TYPE      TYPE       ID       NAME      DATA CLASS
    ---(1)----   --(2)---  --(3)---  ---(4)---  --(5)--  --(6)---  ---(7)----
                 LIB1      3495-L50  AUTOMATED  0001C    LIB1CON   DCATLDS
                 LIB2      3495-M10  MANUAL     0002C    LIB2CON   DCMTLDS
                 --------  --------  ---------  -----    --------  ----------
                 --------  --------  ---------  -----    --------  ----------
                 --------  --------  ---------  -----    --------  ----------
                 --------  --------  ---------  -----    --------  ----------
                 --------  --------  ---------  -----    --------  ----------
                 --------  --------  ---------  -----    --------  ----------
    ----------   --------  ------  BOTTOM  OF  DATA  ------  --------  ------
```

Figure 66. Tape Library List Panel (part 1 of 4).

```
  Panel  List  Utilities  Scroll  Help
----------------------------------------------------------------------------
                            TAPE LIBRARY LIST
Command ===>                                               SCROLL ===> PAGE
                                                  Entries 1-11 of 24
                                                  Data Columns 8-13 of 22
CDS Name . :SCDS.TEMP.PRIMARY

Enter Line Operators Below:

    LINE       LIBRARY   ENTRY DEF  EJECT     NUM      EMPTY    MEDIA1    MEDIA1
   OPERATOR    NAME      USE ATTR   DEFAULT   SLOTS    SLOTS    SCR NUM   SCR THR
   ---(1)----  --(2)---  ---(8)---  --(9)--   -(10)-   -(11)-   -(12)--   -(13)--
               LIB1      PRIVATE    KEEP       16260    2050     1250       100
               LIB2      PRIVATE    KEEP      100000   65000     2100       100
               --------  -------    ----      ------   ------   ------    -------
               --------  -------    ----      ------   ------   ------    -------
               --------  -------    ----      ------   ------   ------    -------
               --------  -------    ----      ------   ------   ------    -------
               --------  -------    ----      ------   ------   ------    -------
               --------  -------    ----      ------   ------   ------    -------
               --------  -------    ----      ------   ------   ------    -------
   ----------  --------  ------  BOTTOM  OF  DATA  ------  --------  --------
```

Figure 67. Tape Library List Panel (part 2 of 4).

```
  Panel  List  Utilities  Scroll  Help
 ------------------------------------------------------------------------------
                           TAPE LIBRARY LIST
 Command ===>                                          SCROLL ===> PAGE
                                                       Entries 1-11 of 24
                                                       Data Columns 14-19 of 22
 CDS Name . :SCDS.TEMP.PRIMARY

 Enter Line Operators Below:

      LINE        LIBRARY   MEDIA2   MEDIA2   MEDIA3   MEDIA3   MEDIA4   MEDIA4
      OPERATOR    NAME      SCR NUM  SCR THR  SCR NUM  SCR THR  SCR NUM  SCR THR
    ---(1)----    --(2)---  -(14)--  -(15)--  -(16)--  -(17)--  -(18)--  -(19)--
                  LIB1          725      150     1100      100  -------  -------
                  LIB2         1750      150        0        0  -------  -------
      --------    ------              -  -------  -------  -------  -------
      --------    ------              -  -------  -------  -------  -------
      --------    ------              -  -------  -------  -------  -------
      --------    ------              -  -------  -------  -------  -------
      --------    ------              -  -------  -------  -------  -------
      --------    ------              -  -------  -------  -------  -------
      --------    ------              -  -------  -------  -------  -------
    ----------  --------  ------  BOTTOM  OF  DATA     -------  -------  -------
```

Figure 68. Tape Library List Panel (part 3 of 4).

```
  Panel  List  Utilities  Scroll  Help
 ------------------------------------------------------------------------------
                           TAPE LIBRARY LIST
 Command ===>                                          SCROLL ===> PAGE
                                                       Entries 1-11 of 24
                                                       Data Columns 20-22 of 22
 CDS Name . :SCDS.TEMP.PRIMARY

 Enter Line Operators Below:

      LINE        LIBRARY   LAST MOD  LAST DATE  LAST TIME
      OPERATOR    NAME      USERID    MODIFIED   MODIFIED
    ---(1)----    --(2)---  --(20)--  ---(21)--- --(22)---
                  LIB1      IBMUSER   1993/07/30 10:16
                  LIB2      IBMUSER   1993/08/10 16:07
      --------    ------    ----------  ---------
      --------    ------    ----------  ---------
      --------    ------    ----------  ---------
      --------    ------    ----------  ---------
      --------    ------    ----------  ---------
      --------    ------    ----------  ---------
      --------    ------    ----------  ---------
    ----------  --------  ------  BOTTOM  OF  DATA  -----
```

Figure 69. Tape Library List Panel (part 4 of 4).

Viewing and Sorting a List

You can sort and tailor a list with the View, Sort, and Hide options on the Mountable
Tape Volume List or the Tape Library List panels. *OS/390 DFSMS: Using the
Interactive Storage Management Facility* discusses the View, Sort, and Hide options
in more detail.

Auditing Volumes in a Tape Library

From the ISMF panels, you can use the AUDIT line operator or the ISMF AUDIT
command to verify the location of the tape volumes in your tape libraries.

AUDIT provides three auditing scopes:
- Single volume audit (invoked by the AUDIT line operator)
- Volume list audit (invoked by the AUDIT command)
- Library audit (invoked by the AUDIT line operator

AUDIT can be invoked as an ISMF line operator on the Mountable Tape Volume List panel (single volume audit) or from the Tape Library List panel (library audit).

AUDIT can also be invoked as an ISMF command to audit all eligible volumes on the Mountable Tape Volume List (volume list audit). ISMF is an important part of the audit scheme because it allows you to start with an entire tape volume list, and then by using sorting and filtering capabilities, you can reduce that list to a subset of volumes; for example, all the volumes in a single storage group. You can then use the AUDIT command to request an audit of all volumes in that subset list.

Note: In an environment with multiple systems at different OS/390 software levels but sharing a common TCDB, library audits should be performed on the system with the highest software level of OS/390. A library audit on a lower level OS/390 software level does not include higher release level volumes if they are media types unknown to the lower level software.

You may want to use the following criteria when filtering a volume list:
- Fully or partially qualified volume serial number
- Fully or partially qualified storage group name
- Fully or partially qualified library name
- Other criteria using ISMF VIEW, SORT, and HIDE

Prior to scheduling an audit request for an automated or manual tape library dataserver, ensure that the following criteria is met:
- The library must be defined in the SMS configuration.
- The library must be online, operational, and not pending offline.
- For an automated tape library dataserver, the library must *not* be in manual mode and the vision system must be operative.

Verifying External Volume Labels Using the ATLDS Vision System

The library vision system on an ATLDS verifies the external label on the volume at the physical location specified in the library manager data base. The cartridge is not mounted and read, only the external label is verified. The following actions are performed when an audit is requested against volumes in an automated tape library dataserver:
- The system verifies that the tape volume has an entry in the library manager.
- The visual system verifies that the tape volume is in its assigned location in the automated tape library dataserver.
- The vision system verifies that the external cartridge label of the tape volume is present and readable.
- The system verifies that the tape is accessible in the automated tape library dataserver.

Verifying VTS Logical Volume Entries in the Library Manager

Because a logical volume may or may not yet exist on a physical piece of media (a stacked volume), the following actions are performed when an audit is requested against logical volumes in the virtual tape server.
- The system verifies that the logical volume has an entry in the library manager.

- If the logical volume resides on a physical piece of media, the vision system verifies that the physical volume is in its assigned location in the automated tape library dataserver.
- The vision system verifies that the external cartridge label of the physical volume is present and readable.

Verifying MTLDS Tape Volume Entries in the Library Manager
Since there is no vision system in a manual tape library dataserver, the system simply verifies that an entry for the tape volume exists in the library manager inventory. If an entry is found, the manual tape library dataserver audit checks the library manager inventory status and may update the TCDB volume error status.

To perform a single tape volume audit from the Mountable Tape Volume list panel, use the AUDIT line operator next to the volume serial number of a tape volume that resides in a tape library dataserver.

Invoking the Audit Command/Line Operator
To perform a volume list audit from the MOUNTABLE TAPE VOLUME LIST panel, use the AUDIT command on the command line of the ISMF panel.

To perform a library audit from the TAPE LIBRARY LIST panel use the AUDIT line operator next to the tape library name. When you specify a library audit, all volume serial numbers known to that library by the host are audited.

Because a library audit and a volume list audit might take a long time to complete, a confirmation panel is displayed whenever these audits are requested. This panel gives you the opportunity to confirm or cancel the audit request. To confirm, type in **Y**, then press ENTER. See Figure 70 for the Confirm Audit Request panel.

```
   Panel  Utilities  Help
 -----------------------------------------------------------------------------
                          CONFIRM AUDIT REQUEST

 Command ===>

   Number of Volumes to be Audited: 5



 Specify the Following:
    Enter "/" to select option    _ Perform Audit



    Note: If audit is performed, audit requests will be interspersed with other
          requests, with the audit request having low priority.




 Use ENTER to Perform Operation;
 Use HELP Command for Help; Use END Command to Exit.
```

Figure 70. Confirm Audit Request Panel

Note: The audit operation can be a lengthy process. During AUDIT execution, other activity in the library is *not* quiesced and AUDIT requests are prioritized lower than other requested functions. It may take *several* hours for you to

receive notification that a full library audit or an extensive volume list audit has completed. Therefore, when scheduling an audit, take work load and time factors into consideration.

Receiving Audit Completion Messages

When you invoke the AUDIT line operator or AUDIT command successfully, AUDIT SCHEDULED is displayed on the Mountable Tape Volume List. A completion message indicating success or failure of the audit is sent to the storage administrator. In the case of using the AUDIT line operator, if the volume is successfully scheduled for an audit, the volume has ***AUDIT** displayed in the line operator column. Audits that are not successfully scheduled have **¬AUDIT** or **?AUDIT** in the line operator column.

When you receive an audit completion message, you can use the **REFRESH** command to update the MOUNTABLE TAPE VOLUME LIST or the TAPE LIBRARY LIST with the same selection criteria. The results of the audit are shown in the VOLUME ERROR STATUS column and you also receive a message with the error results.

Identifying Audit Discrepancies

If discrepancies are found when performing an audit, they are related to you by the following means:

- Scheduling error messages for full library audits are issued to your TSO logon session, unless the scheduling error occurred prior to any volumes from the library being successfully scheduled and that error was severe enough to prevent any other volumes in the library from also being scheduled. This early detected severe error is reported on the ISMF panel through the help facilities offered by ISMF. Messages contain the volume serial number (if known) of the volume for which the error was found and text that indicates the type of error found in attempting to validate an audit request.

  If the scope of the audit is volume list or single volume, scheduling errors are not reported to your TSO logon session. These errors are indicated on return to the ISMF panel from which the AUDIT request was initiated and can be interrogated by using the message and help facilities offered through the ISMF panels. Refer to *OS/390 DFSMSdfp Storage Administration Reference* for more information about the ISMF message and help facilities.

- Errors incurred while attempting to perform the physical audit for any of the three audit scopes, (single volume, volume list, or full library) are reported to your TSO logon session.

- After auditing a volume, the error status field (ERRSTAT) of the tape configuration database (TCDB) volume record is updated.

- As notification that the audit has been completed and that the error status fields can be reviewed, a completion message is sent to you.

  Note: The volume error status field contains only the last error found; no history is kept.

Detecting Software Errors

For both an automated and a manual tape library dataserver, if a software error (such as an internal label error) exists prior to an AUDIT and the AUDIT detects no errors, the software error is retained and *not* updated. Only one value is retained in the volume error status field. No history of errors is maintained for this field. If no software error exists prior to the AUDIT, the volume error status field is updated with the new volume error status.

No attempts are made to fix the problems at the time of detection because, based on the error found, the software is unable to determine exactly what the corrective action should be.

If you end the TSO session before the audit completes, messages are stored in the broadcast data set and are displayed the next time you initiate your TSO session.

Altering the Volume Record
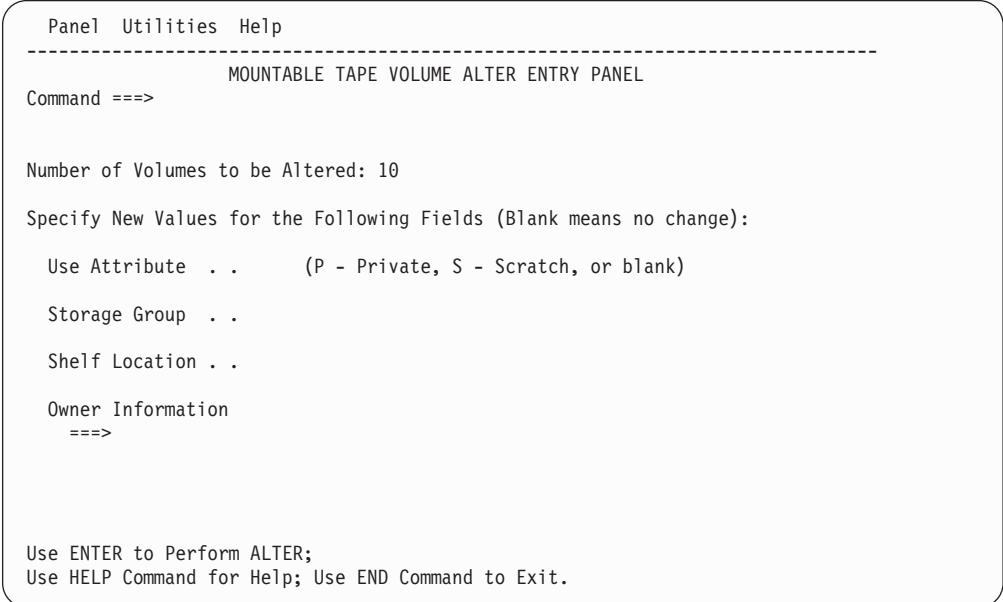
ISMF allows you to alter the use attribute, storage group, shelf location, and owner information of a single tape volume or a volume list through the use of the ALTER line operator or the ISMF ALTER command. These commands are used from the Mountable Tape Volume List panel (see Figure 61 on page 267).

ISMF is an important part of the alter scheme when used in conjunction with the ALTER command because it allows you to start with an entire tape volume list, and then by using sorting and filtering capabilities, you can reduce that list to a subset of volumes; for example, all the volumes in a single storage group. You can then use the ALTER command against the subset list to change information for *all* the volumes on the list at once. You can also use the ALTER command to take the volume out of the error category in the library manager inventory.

Invoking the Alter Command/Line Operator

When you invoke the ALTER command on the MOUNTABLE TAPE VOLUME LIST panel, the same values for use attribute, storage group, shelf location, and owner information are assigned to ALL the volumes in the list.

The Mountable Tape Volume Alter Entry Panel (Figure 71) is displayed.

```
   Panel  Utilities  Help
 ------------------------------------------------------------------------------
                    MOUNTABLE TAPE VOLUME ALTER ENTRY PANEL
 Command ===>


 Number of Volumes to be Altered: 10

 Specify New Values for the Following Fields (Blank means no change):

   Use Attribute  . .      (P - Private, S - Scratch, or blank)

   Storage Group  . .

   Shelf Location . .

   Owner Information
     ===>




 Use ENTER to Perform ALTER;
 Use HELP Command for Help; Use END Command to Exit.
```

Figure 71. Alter from the Mountable Tape Volume Alter Entry Panel

When the ALTER line operator is entered from the Mountable Tape Volume List panel, the Mountable Tape Volume Alter Entry Panel (see Figure 72 on page 278) is displayed to allow the storage administrator to enter the new values for the specific

volume requested. The following four screen examples provide more information
regarding the ALTER function for a specific tape volume.

```
  Panel  Utilities  Help
 ------------------------------------------------------------------------------
                  MOUNTABLE TAPE VOLUME ALTER ENTRY PANEL
Command ===>

Tape Volume :EMB001

Specify New Values for the Following Fields:      (leave as-is if no change)

Use Attribute: Old Value   :PRIVATE
               New Value . . P         (P - Private or S - Scratch)

Storage Group: Old Value   :
               New Value . .

Shelf Location:Old Value   :
               New Value . .

Owner Information:
    Old Value:
New Value  . .

Use ENTER to Perform ALTER;
Use HELP Command for Help; Use END Command to Exit.
```

Figure 72. Mountable Tape Volume Alter Entry Panel Displayed (ALTER Request)

Adding Values to the Tape Volume Information

If, when the volume was entered into the library, no values were specified for storage group name, shelf-location, or owner information, the OLD VALUE fields on this panel are blank and the tape volume record reflects blanks in these fields in the TCDB. The storage administrator then adds the values for owner information, storage group, and shelf location into the NEW VALUE field and hits ENTER. The fields are updated in the TCDB, and the next time the volume is displayed, the new information appears in the OLD VALUE fields. The NEW VALUE field is primed with the same information as well (see Figure 73).

```
  Panel  Utilities  Help
 ------------------------------------------------------------------------------
                   MOUNTABLE TAPE VOLUME ALTER ENTRY PANEL
 Command ===>

 Tape Volume:EMB001

 Specify New Values for the Following fields:      (leave as-is if no change)

 Use Attribute: Old Value   :PRIVATE
                New Value . . P        (P - Private or S - Scratch)

 Storage Group: Old Value   :MTLGRP1
                New Value . . MTLGRP1

 Shelf Location:Old Value   :EILEENS DESK
                New Value . . EILEENS DESK

 Owner Information:
     Old Value:EILEEN
 New Value  . . EILEEN

 Use ENTER to Perform ALTER;
 Use HELP Command for Help; Use END Command to Exit.
```

Figure 73. Both OLD VALUE and NEW VALUE Reflect the Values Assigned to the Volume

Changing Values Associated with a Tape Volume

If the storage administrator types blanks over the NEW VALUE for storage group, shelf location, or owner information, the corresponding field in the tape volume record is set to blank and the NEW VALUE field shows as blank the next time the record in displayed. See Figure 74 on page 280.

```
   Panel  Utilities  Help
  -------------------------------------------------------------------------------
                    MOUNTABLE TAPE VOLUME ALTER ENTRY PANEL
  Command ===>

  Tape Volume:EMB001

  Specify New Values for the Following Fields:     (leave as-is if no change)

  Use Attribute: Old Value   :PRIVATE
                 New Value . . P        (P - Private or S - Scratch)

  Storage Group: Old Value   :
                 New Value . .

  Shelf Location:Old Value   :EILEENS DESK
                 New Value . . EILEENS DESK

  Owner Information:
     Old Value:EILEEN
  New Value  . . EILEEN

  Use ENTER to Perform ALTER;
  Use HELP Command for Help; Use END Command to Exit.
```

Figure 74. NEW VALUE Blanked Out for Storage Group

Note that both the OLD VALUE and the NEW VALUE for storage group are now
blank. To add a storage group again, the storage administrator indicates the new
value for storage group in the NEW VALUE field and hits ENTER (see Figure 75).

```
   Panel  Utilities  Help
  -------------------------------------------------------------------------------
                    MOUNTABLE TAPE VOLUME ALTER ENTRY PANEL
  Command ===>

  Tape Volume:EMB001

  Specify New Values for the Following Fields:     (leave as-is if no change)

  Use Attribute: Old Value   :PRIVATE
                 New Value . .            (P - Private or S - Scratch)

  Storage Group: Old Value   :
                 New Value . . MTLGRP2

  Shelf Location:Old Value   :EILEENS DESK
                 New Value . . EILEENS DESK

  Owner Information:
     Old Value:EILEEN
  New Value  . . EILEEN

  Use ENTER to Perform ALTER;
  Use HELP Command for Help; Use END Command to Exit.
```

Figure 75. New Storage Group Assigned After Storage Group was Altered to Blank

Validating New Values through ISMF

ISMF validates the NEW VALUE input for the use attribute to allow only 'P' or 'S'.
The NEW VALUE input for storage group is validated on the same selection entry
panel; however, blanks are acceptable in this field.

ISMF does not validate the existence of the storage group in the active configuration; however, if the tape volume is library-resident, OAM provides the validation to ensure the following:
- The volume's storage group is defined in the current ACDS as a tape storage group.
- The volume's library is defined in the specified storage group.
- The volume's library is defined in the current ACDS as a valid tape library.

   Note: If the tape volume is shelf-resident, only the first check is made.

Detecting Errors with New Values
If OAM detects an error in any of the above conditions, neither the use attribute nor the storage group is changed. Shelf location and owner information are not prevented from being altered even though an error is detected.

When an error occurs during the ALTER function, a message is stored in the message history for the entry. The storage administrator can issue the message line operator to obtain the error information.

Confirming an Alter Request
When the storage administrator presses ENTER to perform the alter, the Confirm Alter Request panel (Figure 76) is immediately displayed. The number of volumes that will be altered is displayed. The storage administrator must confirm the alter request by changing "N" to "Y" and pressing ENTER.

```
   Panel  Utilities  Help
  -------------------------------------------------------------------------------
                            CONFIRM ALTER REQUEST
 Command ===>


 Number of Volumes to be Altered:10



    Enter "/" to select option    _ Perform Alter









 Use ENTER to Perform Operation;
 Use HELP Command for Help; Use END Command to Exit.
```

Figure 76. Confirm Alter Request Confirmation Panel

Changing the Use Attribute from Private to Scratch
If the storage administrator uses the ALTER command to specify a NEW VALUE of scratch for the use attribute and any of the volumes on the list are private with an expiration date that has not yet passed, the Private to Scratch Confirmation Panel (Figure 77 on page 282) is displayed for *each* volume whose expiration date has not yet passed.

Note: When DFSMSrmm is installed, any attempt to alter the use attribute from private to scratch will be rejected.

```
  Panel  Utilities  Help
 ------------------------------------------------------------------------------
                      PRIVATE TO SCRATCH CONFIRMATION PANEL
 Command ===>


                      Confirm Alter of Volume: EMB001

         Currently this Volume is Private and
         Its Expiration Date has not yet Passed.

 Enter "/" to select option    _  Do you still want to change it to scratch?

         You may specify that all private volumes on
         the list should be changed to scratch whether
         or not their expiration dates have passed.
         If you do, the volumes will be changed without
         redisplaying this confirmation panel.

 Enter "/" to select option    _  Allow All Private Volumes to be
                                  Changed to Scratch?

 Use ENTER to Perform Operation;
 Use HELP Command for Help; Use END Command to Exit.
```

Figure 77. Private to Scratch Confirmation Panel

If the response is "**/**" on either confirmation panel, OAM changes the following items:
- The use attribute is changed to **S** in the TCDB.
- The storage group name is set to ***SCRTCH*** in the TCDB.
- The expiration date in the TCDB is blanked out.
- The volume error status is reset to NO ERROR in the TCDB.
- The library manager category of the cartridge is changed from private to scratch.

Note: The change use attribute installation exit (CBRUXCUA) is invoked whenever there is an attempt to change the use attribute for a tape volume. It may override the request or change the values. Refer to "Change Use Attribute Installation Exit (CBRUXCUA)" on page 149 for more information on this installation exit.

Changing the Use Attribute from Scratch to Private

When the ALTER line operator or the ALTER command changes the use attribute for a single tape volume or a list of tape volumes to private, the following items are performed:
- The use attribute is changed to **P** in the TCDB.
- The volume error status is reset to NO ERROR in the TCDB.
- The category of the cartridge or cartridges is changed from scratch to private.

The changes to the TCDB volume record are performed immediately. When the line operator or command is complete, the user is returned to the Mountable Tape Volume List panel with the appropriate success or failure message. If the volume or volumes were successfully changed, the ISMF REFRESH command may be used to display the new values in the tape volume record.

Ejecting a Volume from a Tape Library

A single library-resident tape volume can be ejected from a tape library dataserver through the use of the ISMF EJECT line operator. The EJECT line operator is used from the MOUNTABLE TAPE VOLUME LIST application (Figure 61 on page 267). The line operator is typed next to a specific volume, causing the volume to be ejected from the tape library.

Note: For logical volumes in the fast ready category at the VTS, ejecting the volume deletes the logical volume from the VTS. If a logical volume is not in the fast category, the volume must be exported from the library.

Specifying Optional EJECT Line Operator Parameters

There are two optional parameters associated with the EJECT line operator. The first optional parameter specifies **K** for KEEP or **P** for PURGE. This parameter determines whether the tape volume record should be kept or deleted in the TCDB once the tape volume is ejected. No matter which disposition is specified, the volume record in the library manager inventory is deleted. If the parameter is not specified, the EJECT DEFAULT for the tape library is used. This parameter can be overridden by the cartridge eject installation exit (CBRUXEJC), which is invoked to approve or deny the EJECT request. See "Cartridge Eject Installation Exit (CBRUXEJC)" on page 164 for more information regarding this installation exit.

The second optional parameter **B** specifies that the tape cartridge is to be placed in the high-capacity output station instead of the convenience output station. If this parameter is not specified or the high-capacity output station is not configured, the cartridge is placed in the convenience output station.

This keyword is only valid for automated tape library dataservers. The keyword is ignored for tape volumes ejected from a manual tape library dataserver.

Note: The EJECT line operator is only valid for tape volumes that are library-resident.

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Glossary

The terms in this glossary are defined as they pertain to the Object Access Method.

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- The *Information Technology Vocabulary*, developed by Subcommittee 1, Joint Technical Committee 1, of the International Electrotechnical Commission (ISO/IEC JTC2/SC1).
- IBM Dictionary of Computing, New York: McGraw-Hill, 1994.

A

ACS.   Automatic class selection.

access method services.   The facility used to define and reproduce VSAM key-sequenced data sets (KSDS), and to manage ICF and VSAM catalogs.

ACDS.   Active control data set.

active control data set (ACDS).   A VSAM linear data set that contains a copy of an active configuration and subsequent updates. All systems in an SMS complex use the ACDS identified in the IGDSMSxx member of the PARMLIB to manage storage.

ATLDS.   Automated tape library dataserver.

attribute.   A named property of an entity.

automated mode.   The mode of operation of an ATLDS in which host requests for mounts and demounts are performed with no operator action.

automated tape library dataserver.   A hardware device that automates the retrieval, storage, and control of tape cartridges.

automatic class selection (ACS).   Routines that determine the data class, management class, storage class, and storage group for a JCL DD statement. The storage administrator is responsible for establishing ACS routines appropriate to an installation's storage requirements.

B

base configuration information.   Part of an SMS configuration, it contains the default management class, default unit, and default device geometry. It also identifies the systems, system groups, or both that an SMS configuration is to manage.

bulk input.   The process of adding a large number of tape cartridges to the ATLDS.

bulk output.   The process of removing a large number of tape cartridges from the ATLDS.

C

CAF.   Call attachment facility.

cartridge.   See *tape cartridge*.

cartridge loader.   An optional feature for the 3480 tape drive. It allows the automatic loading of tape cartridges which have been placed into a loading rack. Manual loading of single tape cartridges is also possible.

category.   A logical subset of volumes in a tape library. A category may be assigned by the library manager (for example, the insert category), or by the software (for example, the private or scratch categories).

CDS.   Control data set.

COMMDS.   Communication data set.

communication data set (COMMDS).   The primary mean of communication among systems in an SMS complex. Shared among the systems in the SMS complex, the COMMDS is a VSAM linear data set that contains the name of the ACDS and current utilization statistics for each system-managed volume.

compatibility mode.   Mode of running DFSMS/MVS 1.3.0 or subsequent releases in which no more than eight unique system or system group names are supported in the SMS configuration. When running in this mode, the system may share configurations and communication data sets with systems running down level releases of DFSMS/MVS or DFP. Otherwise, configurations and communication data sets may not be shared.

composite library.   The virtual view of the Peer-to-Peer VTS subsystem to the host. In general, host communications with the library will be at the composite level with the virtual volumes and drives being defined to the composite library.

console name.   Specifies the name of the MVS console associated with the library being defined. The

console name provides precise routing of console messages pertaining to a specific library.

container. A receptacle in which one or more exported logical volumes can be stored. A stacked volume containing one or more logical volumes and residing outside a virtual tape server library is considered to be the container for those volumes.

control data set (CDS). With respect to SMS, a VSAM linear data set containing configurational, operational, or communication information. SMS uses three types of control data sets: the source control data set (SCDS), the active control data set (ACDS), and the communication data set (COMMDS).

convenience input. The process of adding a small number of cartridges to the ATLDS without interrupting automated operations.

convenience output. The process of removing a small number of cartridges from the ATLDS without interrupting automated operation.

D

DFSMSdfp. Data Facility Storage Management Subsystem data facility product. An IBM licensed program used to manage programs, devices, and data in an MVS environment. It is a component of the DFSMS/MVS system.

DFSMSdss. Data Facility Storage Management Subsystem data set services. A component of DFSMS/MVS that provides data movement, copy, backup and space management functions.

DFSMShsm. Data Facility Storage Management Subsystem hierarchical storage management. A component of DFSMS/MVS that provides backup, recovery, migration and space management functions.

DFSMSrmm. Data Facility Storage Management Subsystem removable media manager. A component of DFSMS/MVS that manages removable media, both inside and outside libraries.

DFSMS/MVS. Data Facility Storage Management Subsystem/Multiple Virtual Storage. An operating environment that helps automate and centralize the management of storage. To manage storage, DFSMS/MVS provides the storage administrator with control over data class, management class, storage class, storage group, and automatic class selection routine definitions.

DFSMS/MVS complex. A set of up to eight SMS systems within an installation that are defined in a single source control data set.

distributed library. An underlying physical library in a Peer-to-Peer VTS subsystem.

DOM. Delete operator message. When a situation indicated by a message changes or is satisfied, the message to the operator is deleted from the console.

E

ESTAE. Extended specify task abnormal exit.

export. The operation to remove one or more logical volumes from a virtual tape server library. First, the list of logical volumes to export must be written on an export list volume and then, the export operation itself must be initiated.

exported logical volume. A logical volume that has gone through the export process and now resides on a stacked volume outside a virtual tape server library.

export list volume. A virtual tape server logical volume containing the list of logical volumes to export.

external label. The machine and human-readable label attached to the outside of a tape cartridge. The label contains the volume serial number of the tape volume.

G

GB. Gigabyte.

gigabyte (GB). A unit of measure for storage capacity. One gigabyte equals 1 073 741 824 bytes.

global resource serialization (GRS). A component of MVS/ESA which provides an access control mechanism used to ensure the integrity of resources in a multisystem environment.

GRS. Global resource serialization.

H

Hardware configuration dialog (HCD). A user-friendly dialog for interacting with MVS for device configuration.

HCD. Hardware configuration dialog.

I

image copy. An exact reproduction of all or part of an image.

installation exit. The means specifically described in an IBM software product's documentation by which an IBM software product may be modified by a customer's system programmers to change or extend the functions of the IBM software product. Such modifications consist of exit routines written to replace one or more existing modules of an IBM software product, or to add one or more modules or subroutines to an IBM software

product, for the purpose of modifying (including extending) the functions of the IBM software product.

ICF. Integrated catalog facility.

ID. Identification, identifier.

IDRC. Improved data recording capability.

import. The operation to enter previously exported logical volumes residing on a stacked volume into a virtual tape server library. First, the list of logical volumes to import must be written on an import list volume and the stacked volumes must be entered, then, the import operation itself must be initiated.

import list volume. A virtual tape server logical volume containing the list of logical volumes to import. This list can contain individual logical volumes to import or it can contain a list of stacked volumes in which all logical volumes on the stacked volume are imported.

imported logical volume. An exported logical volume that has gone through the import process and can be referenced as a tape volume within a virtual tape server library. An imported logical volume originates from a stacked volume that went through the export process.

integrated catalog facility (ICF). In the Data Facility Product (DFP), a facility that provides for integrated catalog facility catalogs.

integrated catalog facility catalog. In the Data Facility Product (DFP), a catalog that consists of a basic catalog structure, which contains information about VSAM and non-VSAM data sets, and at least one VSAM volume data set, which contains information about VSAM data sets only.

Interactive Storage Management Facility (ISMF). An ISPF application that provides an interactive set of space management functions.

Interactive System Productivity Facility (ISPF). An IBM licensed program that serves as a full-screen editor and dialogue manager. Used for writing application programs, it provides a means of generating standard screen panels and interactive dialogues between the application programmer and terminal user.

IODF. An input/output definition file (IODF) is a VSAM linear data set that contains I/O definition information. This information includes processor I/O definitions and operating system I/O definitions. A single IODF can contain several processor and several operating system I/O definitions.

ISPF. Interactive System Productivity Facility.

ISMF. Interactive Storage Management Facility.

ISO. International Organization for Standardization.

K

KB. Kilobyte.

kilobyte (KB). A unit of measure for storage capacity. One kilobyte equals 1 024 bytes.

L

LCS. Library Control System.

LCSPL. LCS External Services parameter list.

Library Control System (LCS). The component of OAM that is used in the support of tape libraries.

library manager. The software application that controls all operations in the tape library dataserver.

library manager database. A database which contains entries for all cartridges in the automated and manual tape library dataserver. Each entry volume serial number, category, physical location, and volume status information.

library record. The library record contains information related to the library such as library name and logical type. The library record resides within the tape configuration database.

linkage editor. A computer program for creating load modules from one or more object modules or load modules by resolving cross references among the modules and, if necessary, adjusting addresses.

link-edit. To create a loadable computer program by means of a linkage editor.

logical volume. Logical volumes have a many-to-one association with physical tape media and are used indirectly by MVS applications. They reside in a Virtual Tape Server or on exported stacked volumes. Applications can access the data on these volumes only when they reside in a Virtual Tape Server which makes the data available via its tape volume cache or after the data has been copied to a physical volume through the use of special utilities.

M

managed manual mode. The mode of operation of a MTLDS that allows the operator to locate and move the cartridges to and from drives and cells under the direction of the library manager. No robot exists for this library mode.

manual mode. The mode of operation of an ATLDS that allows the operator to locate and move the cartridges to and from drives and cells under the direction of the library manager. The robot is not operating.

manual tape library dataserver. An installation-defined set of tape drives and the set of tape volumes that can be mounted on those drives. The IBM implementation includes one or more 3490 or 3490E subsystems, each connected by a Library Attachment Facility to a controller running the Library Manager application, and a set of volumes, defined by the installation a part of the library, which reside in shelf storage located near the 3490 subsystem.

MB. Megabyte.

MEDIA1. Cartridge System Tape.

MEDIA2. Enhanced Capacity Cartridge System Tape.

MEDIA3. High Performance Cartridge Tape

MEDIA4. Extended High Performance Cartridge Tape

Megabyte (MB). A unit of measure for storage capacity. One megabyte equals 1 048 576 bytes.

mount. A host-linked operation which results in a tape cartridge being physically inserted into a tape drive.

MTLDS. Manual Tape Library Dataserver.

MVS/ESA. Multiple Virtual Storage/Enterprise Systems Architecture.

O

OAM. Object Access Method.

Object Access Method (OAM). A DFSMSdfp component used in the support of tape libraries.

offline. To make a tape library or a tape drive logically unavailable to a system.

online. To make a tape library or a tape drive logically available to a system.

OAM Storage Management Component (OSMC). Where objects should be stored, manages object movement within the object storage hierarchy and manages expiration attributes based on the installation storage management policy.

Object Storage and Retrieval (OSR). Component of OAM that stores, retrieves, and deletes objects. OSR stores objects in the storage hierarchy and maintains the information about these objects in DB2 databases.

OSMC. OAM Storage Management Component.

OSR. Object Storage and Retrieval.

P

partitioning. Dividing the resources in a tape library (tape drives and tape volumes) among multiple systems or sysplexes, or both for their exclusive use. Each partition may be viewed as a logical library with each logical library (TCDBplex) represented by one TCDB.

paused mode. The mode of operation of an ATLDS where all host commands that require movement of cartridges are queued until the library is returned to automated mode. The robot is not operating. This mode allows the operator to enter the enclosure area briefly to correct a problem, add cartridges to the bulk input station, or remove cartridges from the bulk output station.

Peer-to-Peer VTS library. Multiple VTS subsystems and their associated tape libraries coupled together to form one subsystem and library image to the host.

physical library. In relationship to a virtual tape server, a physical library is a hardware enclosure consisting of 1 or more virtual tape server libraries with each virtual tape server being identified to the host as a separate library. Restrictions by the library manager may be set on an individual library basis or on a physical library basis as is the case with import.

physical volume. Physical volumes have a one-to-one association with physical tape media and are used directly by MVS applications. They may reside in an automated tape library dataserver or be kept on shelf storage either at vault sites or within the data center where they can be mounted on stand-alone tape drives.

private tape volume. A volume assigned to specific individuals or functions.

R

reentrant. The attribute of a program or routine that allows the same copy of a program or routine to be used concurrently by two or more tasks.

removable media. Volumes that can be removed from the hardware devices where they are read and written, for example, tape cartridges and optical disks.

S

SCDS. Source control data set.

scratch pool. The collection of tape cartridges from which requests for scratch tapes can be satisfied.

scratch tape volume. An unassigned tape volume.

shelf-resident tape volume. A tape volume that resides outside of a tape library.

stacked volume. Stacked volumes have a one-to-one association with physical tape media and are used in a Virtual Tape Server to store logical volumes. Stacked volumes are not used by MVS applications but by the Virtual Tape Server and its associated utilities. They

may be removed from a Virtual Tape Server to allow transportation of logical volumes to a vault or to another Virtual Tape Server.

Storage Management Subsystem. See *DFSMS/MVS.*

System Modification Program/Extended. Basic tool for installing software changes in programming systems. It controls these changes at the element (module or macro) level, which helps protect system integrity.

SMSplex. A group of one or more MVS systems that share a common set of SMS control data sets: the active control data set (ACDS) and the communications data set (COMMDS).

T

tape cartridge. A case containing a reel of magnetic tape that can be put into a tape unit without stringing the tape between reels.

tape configuration database (TCDB). An ICF user catalog marked as a volume catalog (VOLCAT) containing tape volume and tape library records.

tape library dataserver. A set of related tape drives and the set of tape volumes which may be mounted on those drives.

tape storage group. A tape storage group is a collection of tape volumes which contain private user data. Each volume normally resides in one of up to eight tape libraries which are associated with the tape storage group. A volume becomes part of the tape storage group when it is mounted to satisfy a scratch volume request for the storage group, or when it is entered into one of the tape libraries and assigned to the storage group by the cartridge entry process. The volume is removed from the storage group when it is returned to scratch after the data sets on it have expired.

tape volume. A reel of magnetic tape.

TCDB. Tape configuration database.

TCDBplex. A group of one or more systems or sysplexes, or both which share the same tape configuration database. The individual systems in the TCDBplex share access to one or more tape library dataservers, and to a common pool of scratch volumes in each tape library. They may also share access to the set of private volumes in each tape library.

TDSI. Tape device selection information.

V

vary offline. To change the status of a tape library or a tape drive from online to offline. When a library or drive is offline, no data may be accessed on tape volumes through the offline drive or the drives in the offline library.

vary online. To change the status of a tape library or a tape drive from offline to online.

virtual tape server (VTS). This subsystem, integrated into the Magstar 3494 or 3495 Tape Library, combines the random access and high performance characteristics of DASD with outboard hierarchical storage management and virtual tape devices and tape volumes.

virtual volume. A tape volume that resides in a tape volume cache of a virtual tape server. Whether the volume resides in the tape volume cache as a virtual volume or on a stacked volume as a logical volume is transparent to the host.

vision system. An intelligent pattern recognition system that consists of a camera and lamps mounted on the gripper assemblies, the vision system controller, and the vision monitor. The vision system scans the external labels on cartridges to provide positive cartridge identification.

volume catalog. An ICF user catalog containing the volume and library entries associated with tape libraries.

volume record. A record containing information related to a volume, such as volume serial number, library name, and storage group. The volume record resides within the tape configuration database.

volume type. Uniquely identifies the type of volume. Tape volumes types include: physical, stacked, logical, imported logical, and exported logical volumes.

VTS. virtual tape server.

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