Document MT6004

T9x40 Tape Drive

Planning and Migration Guide

StorageTek

T9x40 Tape Drive

Planning and Migration Guide

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Summary of Changes

Date	Edition	Change
2/99	A	Initial Release
10/99	B	Refer to this edition for a description of the changes.
2/00	C	Refer to this edition for a description of the changes.
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8/02	J	Added L5500 and T9940B information. Deleted information redundant to the System Assurance Guide. Updated references to reflect T9x40 format. Added Appendix A for T9940A to T9940B migration informatoion.

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Preface

This guide is for personnel involved in the planning and data migration strategy of the StorageTek T9x40 Tape Drives.

The term T9x40 refers to all model numbers of T9840 and T9940 drives. The term T9840 (no suffix) is used for all T9840 drives. The term T9940 (no suffix) is used for all T9940 drives. Model number suffixes are used when/where differentiation to specific drive model is necessary.

This guide does not repeat the product overview, installation planning, connectivity, and configuration information contained in the System Assurance Guide. (Refer to *T9x40 Tape Drive System Assurance Guide, MT5003*)

Organization

This guide contains the following information:

Chapter 1	"Planning and Migration Process" describes the planning team and lists the tasks required for a successful installation.
Chapter 2	"Enterprise Support Planning" describes the enterprise software and job control language (JCL) commands for the drive.
Chapter 3	"Multi-platform Support Planning" describes the multi-platform control software for the drive.
Chapter 4	"Application Changes Planning" describes the application software changes required for the drive.
Chapter 5	"Data Migration" describes the strategy and lists helpful resources for migrating data to T9x40 media.
Appendix A	."T9940A to T9940B Migration" provides supplemental information about data migration and media management issues specific to T9940A/T9940B.
Glossary	Defines terms used in this guide.
Index	Helps you find information in this guide.

Alert Messages

Alert messages call the reader's attention to information that is especially important or that has a unique relationship to the main text or graphic.

Note: A note provides additional information that is of special interest. A note might point out exceptions to rules or procedures. A note usually, but not always, follows the information to which it pertains.

CAUTION:
A caution informs the reader of conditions that might result in damage to hardware, corruption of data, corruption of application software, or long-term health problems in people. A caution always precedes the information to which it pertains.

WARNING:
A warning alerts the reader to conditions that might result in injury or death. A warning always precedes the information to which it pertains.

Related Publications

The following publications relate to T9x40 Tape Drives and/or tasks contained in this guide:

Title	Part Number
T9840 Tape Drive User's Reference Manual	95739
T9940 Tape Drive Operator's Guide	95989
T9x40 Tape Drive System Assurance Guide	MT5003
Introducing IBM Enterprise Systems Connectivity	GA23-0383
IBM's ESCON I/O Interface	SA22-7202
MVS/ESA System Programming Library Intitialization and Tuning	GC28-1828
VM/SP HPO Planning Guide and Reference	SC19-6223
VM/SP Planning Guide and Reference	SC19-6201
HSC 5.0 System Programmer's Guide	313486401
HSC 5.0 Configuration Guide	313486201
NCS 5.0 Installation Guide	313486001
Automated Cartridge System Library Software Installation, Configuration, and Administration Guide 6.1	313495801

Conventions

Typographical conventions highlight special words, phrases, and actions in this publication.

Item	Example	Description of Convention
Buttons	MENU	Font and capitalization follows label on product
Commands	Mode Select	Initial cap
Document titles	*System Assurance Guide*	Italic font
Emphasis	*not* or *must*	Italic font
File names	`fsc.txt`	Monospace font
Hypertext links	Figure 2-1 on page 2-5	Blue (prints black in hard-copy publications)
Indicators	*Open*	Font and capitalization follows label on product
Jumper names	TERMPWR	All uppercase
Keyboard keys	<Y> <Enter> or <Ctrl+Alt+Delete>	Font and capitalization follows label on product; enclosed within angle brackets
Menu names	Configuration Menu	Capitalization follows label on product
Parameters and variables	Device = *xx*	Italic
Path names	`c:/mydirectory`	Monospace font
Port or connector names	SER1	Font and capitalization follows label on product; otherwise, all uppercase
Positions for circuit breakers, jumpers, and switches	ON	Font and capitalization follows label on product; otherwise, all uppercase
Screen text (including screen captures, screen messages, and user input)	`downloading`	Monospace font
Switch names	Power	Font and capitalization follows label on product
URLs	http://www.storagetek.com	Blue (prints black in hard-copy publications)

Additional Information

StorageTek offers several methods for you to obtain additional information.

StorageTek's External Web Site

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

The URL for the StorageTek external Web site is http://www.storagetek.com

Customer Resource Center

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

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

e-Partners Site

StorageTek's e-Partners site, formerly known as the Partners Page or the Channels Site, is a Web site that provides information about products, services, customer support, upcoming events, training programs, and sales tools to support StorageTek's e-Partners. Access to this site, beyond the e-Partners Login page, is restricted. On the e-Partners Login page, StorageTek employees and current partners who do not have access can request a login ID and password and prospective partners can apply to become StorageTek resellers.

The URL for the e-Partners site is http://channels.stortek.com.

Global Services Support Tools

StorageTek's Global Services Support Tools mission is to provide tools that aid in the sales and support of StorageTek's products and services, and to meet or exceed the defined requirements of Customers by delivering tools on time and to specifications. This is an internal Web site for StorageTek employees.

The URL for the Global Services Support Tools is http://wwssto.stortek.com

Documents on CD

Documents on CD (3106600xx) contains portable document format (PDF) files of StorageTek's tape, library, OPENstorage disk, and StorageNet publications. To order *Documents on CD*, contact your local Customer Services Logistics Depot. *Documents on CD* is only for StorageTek employees.

Hardcopy Publications

You may order paper copies of publications listed on the CRC or included on the *Documents on CD*.

Service publications have *numeric* part numbers. To order paper copies of service publications, contact your local Customer Services Logistics Depot.

Marketing publications have *alphanumeric* part numbers. To order paper copies of marketing publications, do one of the following:

- Visit StorageTek's PowerPort and select alphabetical listings under "L" or select `Online Forms`. Then search for Literature Distribution. Follow the instructions on the Literature Distribution Web page.
- Send e-mail to DistrL@louisville.stortek.com.

Comments and Suggestions

A Reader's Comment Form at the back of this publication lets you communicate suggestions or requests for change. StorageTek encourages and appreciates reader feedback.

StorageTek employees with access to PowerPort may complete an online Reader's Comment Form. Point your browser to http://sts.stortek.com/sts/tis/tisrcf.htm

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Planning and Migration Process 1

This chapter outlines the planning and migration process by describing the planning and migration team and its tasks.

Planning and Migration Team

To ensure an error-free transition to T9x40 drives, choose a planning team and define each member's tasks. Members of the planning team should include appropriate StorageTek personnel and customer representatives.

- **The Planning Coordinator** is responsible for making sure that all planning and ordering activities take place on schedule.
- **The Physical Planner** is responsible for choosing the location of the new system. The physical planner makes sure that all environmental, electrical, and space requirements are met.
- **The System and Application Programmers** are responsible for choosing the applications that will use the system. The system programmer tests the applications that will be used with the T9x40 Tape Drive and works with the storage administrator to define a storage management policy. The application programmer creates and modifies specific application programs as needed.
- **The Storage Administrator** defines a storage management policy and plans for the migration of data. See the appropriate planning, installation, and storage administration manuals for the operating system to locate information for these four tasks:
  - Analyzing business needs
  - Analyzing processing environment
  - Estimating resource requirements
  - Migrating data.

Planning and Migration Tasks

The following pages list the task assignments and provide checklists for planning and migration.

Planning Tasks

The following tables list the tasks and personnel required for preinstallation planning and data migration to a system using the T9x40 Tape Drive.

- Assignments before ordering (Table 1-1)
- Assignments when ordering (Table 1-2 on page 1-4)
- Assignments for 15 weeks before delivery (Table 1-3 on page 1-4)
- Assignments for 10 weeks before delivery (Table 1-4 on page 1-6)
- Assignments for six weeks before delivery (Table 1-5 on page 1-6)
- Assignments for four weeks before delivery (Table 1-6 on page 1-7)
- Assignments at the arrival of the T9x40 Tape Drive (Table 1-7 on page 1-7)

StorageTek personnel order the equipment after forming a team with the customer personnel to determine the customer's requirements.

Table 1-1. Assignments Before Ordering

Activity	Planning Coordinator	Physical Planner	System Programmer	Application Programmer	Storage Administrator
Choose team members.	•				
Determine software requirements. **Note:** Refer to Chapter 2, "Enterprise Support Planning," and Chapter 3, "Multi-platform Support Planning," for T9x40 software information.			•		
Determine number of drives needed					•
Determine cable requirements.	•	•			
Determine electrical requirements.		•			
Analyze end-user requirements.	•	•	•	•	
Determine number of T9x40 media cartridges needed.			•		•
Determine required number of T9x40 cleaning cartridges needed.			•		•
Determine number of labels/drives					•
Determine number of drive addresses			•		

Table 1-2. Assignments When Ordering

Activity	Planning Coordinator	Physical Planner	System Programmer	Application Programmer	Storage Administrator
Work with the StorageTek installation consultant (IC) and marketing representative to order the T9x40 hardware, the data media cartridges, the cleaning cartridges, and the media cartridge labels.	•				
Attend system assurance planning and review meetings with the StorageTek team.	•	•	•	•	•

Table 1-3. Assignments for 15 Weeks Before Delivery

Activity	Planning Coordinator	Physical Planner	System Programmer	Application Programmer	Storage Administrator
Order T9x40 applicable software upgrades:					
Host Operating System/Driver	•		•		
TIPS	•		•		
LMU or library	•		•		
ACSLS	•		•		
HSC	•		•		
NCS	•		•		
Backup/restore application	•		•		
Install the T9x40 applicable software upgrades.			•		

Table 1-3. Assignments for 15 Weeks Before Delivery (Continued)

Activity	Planning Coordinator	Physical Planner	System Programmer	Application Programmer	Storage Administrator
Analyze the storage management policies; plan for data conversion and migration.			•		•
Identify the applications to migrate to the T9x40 system.			•	•	•
Select the location for the T9x40 Tape Drives and arrange for any site modifications.		•			
Select the internal delivery route to the planned location of the T9x40 Tape Drives.		•			
Prepare the physical location.		•			
Determine who installs electrical wiring and outlets.		•			
Verify the T9x40 equipment order.	•				

Table 1-4. Assignments for 10 Weeks Before Delivery

Activity	Planning Coordinator	Physical Planner	System Programmer	Application Programmer	Storage Administrator
Discuss the planning process concerns with the StorageTek marketing representative.	•	•	•	•	•
Start software installation.			•		
Arrange for installation of electrical wiring and outlets.		•			

Table 1-5. Assignments for Six Weeks Before Delivery

Activity	Planning Coordinator	Physical Planner	System Programmer	Application Programmer	Storage Administrator
Meet with the StorageTek marketing representative to review the progress of the installation and resolve any scheduling problems.	•	•	•	•	•
Begin the installation of the electrical wiring and outlets.		•			
Finish the testing of operating system and application software.			•	•	

Table 1-6. Assignments for Four Weeks Before Delivery

Activity	Planning Coordinator	Physical Planner	System Programmer	Application Programmer	Storage Administrator
Finish the installation and testing of the electrical wiring and outlets.		•			
Complete the site preparation.		•			
Train the system operators.	•		•		

Table 1-7. Assignments at the Arrival of the T9x40 Tape Drive

Activity	Planning Coordinator	Physical Planner	System Programmer	Application Programmer	Storage Administrator
Locate the system as close as possible to the final location.		•			
Arrange for a service representative to install the system.	•				
Activate and test the systems and application software.			•	•	
Host a post-review to identify any problems that can be avoided in future installations, and include the StorageTek representative.	•	•	•	•	•

Planning Checklists

The following checklists help the planning coordinator ensure that all tasks are identified before the installation or migration to the T9x40 Tape Drives.

Note: Use these checklists with the T9x40 software installation checklist.

Configuration Planning

Configuration planning tasks include:

Determine the required performance characteristics.

1. __Determine the throughput requirements.
2. __Determine the access time requirements.

Determine the subsystem configuration needed to meet the performance requirements.

1. __Determine the number of required tape drives.
2. __Determine the cartridge requirements.
3. __Determine the manual or library attachment requirements.
4. __Determine the CSL attachment requirements.

Site Planning

Site planning tasks include:

1. __Determine the power and air conditioning requirements.
2. __Determine the equipment location and/or relocation.
3. __Reserve space for the documentation.
4. __Determine the number and length of required cables.
   - Power cables
   - ESCON cables
   - FC cables
   - SCSI cables
5. __ Determine the channel attachments from the host to the T9x40.
   - ESCON connection
   - FC connection
   - SCSI connection
6. __Assign the device addresses.
7. __Determine the number of tape drives.
8. __Determine the number and type of cartridge storage cabinets.

9. __Determine the number and type of required cartridge system tapes.
10. __Determine the number of cleaning cartridges.
11. __Design a floor plan for the equipment layout.
12. __Prepare for any equipment rearrangement.

To determine requirements for media cartridge labels:

1. __Determine if the StorageTek ACS will share data cartridges.
2. __Determine the number of labels required by type.
3. __Determine the label numbering sequences.
4. __Determine if label and initialization services are required.

To order equipment and consumables:

1. __Order the machines and features.
2. __Order the cartridge storage cabinets.
3. __Order the data and cleaning cartridges.
4. __Order the cables.
5. __Order the labels.
6. __Order any needed documentation.
7. __Schedule any needed facility changes.

Software Planning

Software includes the following:

- Operating systems
- Third party software
- StorageTek host-based software

Note: See Chapter 2, "Enterprise Support Planning," Chapter 3, "Multi-platform Support Planning," and Chapter 4, "Application Changes Planning," for information about software planning.

Software planning tasks include the following:

- __Identify the software releases and required maintenance.
- __Identify the required changes or user modifications.

Note: For the above two items, StorageTek personnel can assist in determining the required levels of software, firmware, and hardware.

- __Identify the vendor software impact.
- __Develop a software build and test plan.
- __Identify operational impact.
- __Coordinate with other project areas.
- __Collect and apply maintenance.
- __Generate the system.
- __Update the documentation and procedures.
- __Schedule test time.
- __Perform a regression test.
- __Perform a stress test.
- __Perform a performance test.
- __Revise the migration plan, if needed.
- __Use the system for limited production.
- __Use the system for full production.

Operations Planning

Operations planning tasks include:

1. __Order the documentation.
2. __Plan for and train operators.
3. __Develop sharing and switching procedures.
4. __Evaluate the T9x40 operations.
5. __Coordinate with other project areas.

Data Migration Tasks

Migration from a current tape system to T9x40 Tape Drives include:

1. Selecting a planning team that is responsible for all preinstallation planning and migration tasks.
2. Selecting the appropriate T9x40 equipment and features that satisfy the system applications.
3. Planning the physical environment for installation of the new drives.
4. Selecting the software required to support the applications used with the new drives.
5. Planning for applications changes necessary for the new drives.
6. Planning for operational changes that might be needed in a T9x40 tape environment.
7. Planning for data migration from the previous tape system to the T9x40.

Data Migration Checklist

Data migration tasks include:

1. __Determine the migration strategy.
2. __Classify the media cartridges.
3. __Inventory the media cartridges by categories.
4. __Determine the media cartridge turnover.
5. __Examine the migration compared to conversion of files.
6. __Coordinate hardware and cartridge availability.
7. __Develop the production schedule.
8. __Produce the migration plan.
9. __Develop the project control procedures.
10. __Select the initial migration files.
11. __Modify the job control language, if necessary.
12. __Run the migration targeted jobs.
13. __Verify the results.

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Enterprise Support Planning

2

This chapter gives details of enterprise software planning for T9x40 Tape Drives.

T9x40 Tape Drives support:

- Standard Job Control Language (JCL) for tape applications
- Dynamic partitioning using the Assign, Unassign, and Control Access commands
- Dynamic pathing using the Set Path Group ID command
- Subsystem message display using the Load Display command
- Supervisor protection using the Mode Set command
- Full read/write support of LZ-1 compression by MVS/ESA, MVS/XA, and VM/ESA
- Toleration support (read only) of LZ-1 compression by VM/ESA

MVS supports conventional tape drive programming, including JCL, utilities, and access methods. These access methods are:

- Basic Sequential Access Method (BSAM)
- Queued Sequential Access Method (QSAM)
- Execute Channel Program (EXCP)

Operating System Requirements

The following pages list the minimum operating system requirements for T9x40 Tape Drives.

MVS/ESA

Table 2-1 shows MVS/ESA operating system versions and related program product software required for the T9x40 in 3490E emulation.

Table 2-1. Requirements for MVS/ESA, 3490E Emulation

JES2	JES3
MVS/ESA System Product Version 3.1.0 with MVS/DFP Version 3.1.1	MVS/ESA System Product Version 3.1.0 with MVS/ESA DFP Version 3.1.1 with JES3 2.2.1 or later

Table 2-2 shows MVS/ESA operating system versions and related program product software required for the T9x40 in 3590 emulation.

Table 2-2. Requirements for MVS/ESA, 3590 Emulation

JES2	JES3
MVS/ESA System Product Version 4.3.0 or higher, plus small program enhancements (SPEs) For dynamic tape sharing: MVS System Product Version 5.2.0	MVS/ESA System Product Version 4.3.0 or higher, plus SPEs, JES3 Version 4.2.1 or higher, and MVS/ESA DFP Version 3.1.1

MVS/XA

Table 2-3 shows MVS/XA operating system versions and related program product software required for the T9x40 in 3490E emulation.

Table 2-3. Requirements for MVS/XA, 3490E Emulation

JES2	JES3
MVS/XA System Product Version 2.2.3 with MVS/DFP Version 3.1.1	MVS/XA System Product Version 2.2.3 with MVS/DFP Version 3.1.1 with JES3 2.2.1 or later

MVS/XA does not support 3590 emulation.

MVS/370

MVS/370 does not support T9x40 Tape Drives in 3490E or 3590 emulation.

Other MVS Products

Programs that use Queued Sequential Access Method (QSAM) and Basic Sequential Access Method (BSAM) can run without change. Other MVS-oriented program products might have operating system release dependencies. Consult the vendor's documentation for release level dependencies for these products.

VM/ESA

VM/ESA Version 2.1 or higher support T9x40 drives in 3590 emulation in native and guest environments and as a stand-alone or library device. Refer to the following IBM guides:

- *Virtual Machine System Planning Guide and Reference*
- *Virtual Machine/ESA Planning Guide and Reference*
- *IBM ESA/Package Hardware and Software Support Extensions*

HSC

Host Software Component (HSC) Release 2.1 or higher supports the T9840A Tape Drive. HSC 2.1 requires MVS 5.2.2.

HSC Release 4.0 or higher supports the T9840B and T9940A Tape Drives.

HSC Release 4.1 or higher supports the T9940B Tape Drives.

In a mixed-media environment, a library might include a combination of drives and cartridges that use:

- 18-track format (4480)
- 36-track format (4490, 9490)
- Helical-scan format (SD-3)
- 288-track format (T9840A/T9840B)
- 288-track format (T9940A)
- 576-track format (T9940B)

In HSC, all library-attached drives such as 4480, 4490, 9490, SD-3, and T9x40 are distinguished as unique. Refer to the appropriate HSC documentation to plan the conversion. See "Related Publications" on page xii.

NCS

Nearline Control Solution (NCS) Release 2.0 or higher supports the T9840A Tape Drive in 3490E and 3590 emulation. The components of NCS 2.0 are:

- HSC 2.1
- Library Station 3.1
- MVS/CSC 3.1

NCS Release 4.0 or higher supports the T9840B and T9940A Tape Drives in 3490E or 3590 emulation. The components of NCS 4.0 are:

- HSC 4.0
- LibraryStation 4.0
- MVS/CSC 4.0

NCS Release 4.1 or higher supports the T9940B Tape Drives in 3490E or 3590 emulation. The components of NCS 4.1 are:

- HSC 4.1
- LibraryStation 4.1
- MVS/CSC 4.1

Refer to the appropriate NCS documentation for more information. See "Related Publications" on page xii.

Other Software

The following software supports the T9x40 Tape Drive in 3590 emulation:

- TPF 4.1 or higher
- EREP Version 3.5.0 plus program temporary fixes (PTFs)
- ADSM for MVS Version 2.1.0
- DITTO/ESA Release 1
- DFSORT Release 13 plus SPEs
- DFSMS/MVS Version 1.2 or higher
- DFSMS/VM RMS
- DB2 Version 4

Generation and Initialization

When adding the T9x40 to your system, consider:

- Channel selection algorithm
- IODEVICE macro for I/O generation
- JES2 and JES3 initialization

Channel Selection Algorithm

In a T9x40 configuration, the channel selection algorithm can affect the drive's performance. To maximize drive performance, always code the preferred path parameter on the IODEVICE macro for each drive. For additional information, refer to the appropriate IOCP or *HCD User's Guide* for your processor, and *Initialization and Tuning* manual for your operating system.

I/O Generation

Each uniquely addressable I/O device in the machine configuration must be specified in an IODEVICE macro instruction. For an I/O generation, all I/O devices that are to be in the new system must be specified. Except for the system-resident device specification, there can be additions, deletions, changes, or the same specifications as those in the last complete system generation.

For more information, refer to the system generation reference manual for your operating system.

The following is a sample IOCP for four T9x40 drives. The four drives are addressed as 580-583. The CHPIDs are paths 30, 31, 32, and 33.

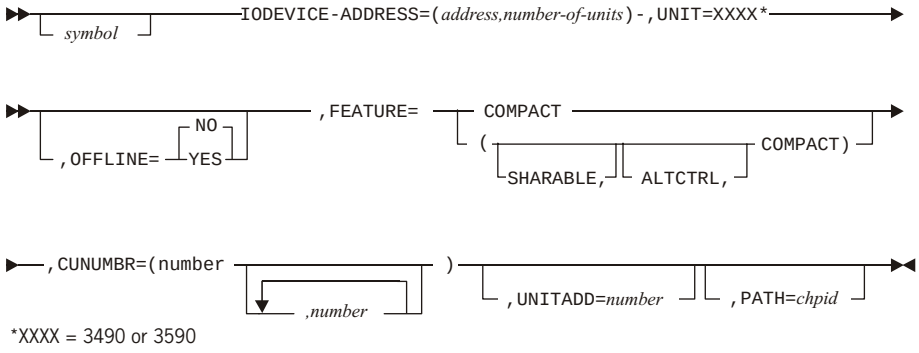
```
CHPID PATH=30,TYPE=CNC
CHPID PATH=31,TYPE=CNC
CHPID PATH=32,TYPE=CNC
CHPID PATH=33,TYPE=CNC
CNTLUNIT CUNUMBER=580,UNIT=XXXX,PATH=(30),UNITADD=(00,01)
CNTLUNIT CUNUMBER=581,UNIT=XXXX,PATH=(30),UNITADD=(00,01)
CNTLUNIT CUNUMBER=582,UNIT=XXXX,PATH=(30),UNITADD=(00,01)
CNTLUNIT CUNUMBER=583,UNIT=XXXX,PATH=(30),UNITADD=(00,01)
IODEVICE ADDRESS=(580,01),CUNUMBER=580,UNIT=XXXX,UNITADD=00
IODEVICE ADDRESS=(581,01),CUNUMBER=581,UNIT=XXXX,UNITADD=00
IODEVICE ADDRESS=(582,01),CUNUMBER=582,UNIT=XXXX,UNITADD=00
IODEVICE ADDRESS=(583,01),CUNUMBER=583,UNIT=XXXX,UNITADD=00
```

For XXXX, substitute 3490 or 3590.

IODEVICE Macro

Figure 2-1 is a syntax diagram that shows how the IODEVICE macro defines the unit control block (UCB).

Figure 2-1. IODEVICE Macro



The following pages describe the IODEVICE macro parameters.

ADDRESS=(*address,number-of-units*)

Specifies the T9x40 unit address of the drive. For each unit address assigned, a UCB is created.

Address specifies the unit address for the device. Specify three hexadecimal digits, 000 through FFF, so that:

- The high-order digit is the address of the channel (specified in a CHANNEL macro).
- The second digit specifies the T9x40.
- The low-order digit is a value from 0 through F.

Note: OS/390 allows four hex digits.

Number-of-units specifies the number of unit addresses needed for the device. Specify a one-, two-, or three-digit decimal value.

For example, if ADDRESS=(130,1) is specified, unit address 130 is defined.

Note: For a T9x40, the number of units *must* be one.

UNIT=XXXX

Specifies the device type for T9x40 drives. For XXXX, substitute 3490 or 3590.

OFFLINE=(YES/NO)

Specifies whether the device is to be considered online or offline at initial program load (IPL) time.

YES specifies that the device is considered offline at IPL time. *Do not* specify YES for any device that the system needs during IPL.

NO specifies that the device is considered online at IPL time. If OFFLINE is not coded, NO is the default.

Note: If FEATURE=SHARABLE is specified, OFFLINE=YES is forced.

FEATURE=([SHARABLE,][ALTCTRL,]COMPACT)

Specifies the features of a device.

SHARABLE ensures that a shared tape drive is not allocated and unloaded. It is your responsibility to partition shared tape drives between processor units. If FEATURE=SHARABLE is specified, then OFFLINE=YES is forced, if not previously specified.

CUNUMBR=(*number*)

Specifies the control unit numbers of the control units to which the device is attached.

UNITADD=*number*

Specifies the device's physical unit address when the ADDRESS=parameter specifies a device number that does not include the physical unit address. Set UNITADD=00.

Esoteric Name

Defining an esoteric name makes migration to future device types easier. RTAPE and PTAPE are good choices as they reflect the letter on the VOLSER label.

Figure 2-2 shows SYSGEN statements that define one T9840A with an esoteric name of RTAPE. Likewise, you can use PTAPE for the T9940.

Figure 2-2. Esoteric Name

```
IODEVICE        ADDRESS=(380,01),     (see note 1)                X
                UNIT=XXXX*            (see note 2)                X
                OFFLINE=YES           (see note 3)

UNITNAME        NAME=RTAPE,                                       X
                UNIT=((380,01))
*XXXX = 3490 or 3590
```

C53349

Notes:

1. In the "IODEVICE" statement, the number of addresses defined for the esoteric name "RTAPE" or "PTAPE" is one.
2. Specify UNIT=3490 or UNIT=3590.
3. For drives shared among JES2 systems, specify OFFLINE=YES. For a JES3 system, specify OFFLINE=NO.

Figure 2-3 shows job statements that separate media types by using esoteric names.

Figure 2-3. Separating Media Types With Esoteric Names

```
SYSUT1          DD    UNIT=SILVER,DISP=(NEW,KEEP,DELETE)
SYSUT1          DD    UNIT=TIMBER,DISP=(NEW,KEEP,DELETE)
SYSUT1          DD    UNIT=REDWOOD,DISP=(NEW,KEEP,DELETE)
SYSUT1          DD    UNIT=RTAPE,DISP=(NEW,KEEP,DELETE)
```

C53350

When a data set is created, the catalog entry reflects the device type on which the data set is created. On a read, when more than one 3590 device type is defined and there is no library-control software installed to assist in allocation, the user must code in the job's JCL a UNIT parameter with the esoteric containing only the 3590 devices that created the dataset name. The user might also have to code the volume serial number. If HSC is installed, HSC manages device separation, and the above statements are not required on a read.

Generic Name

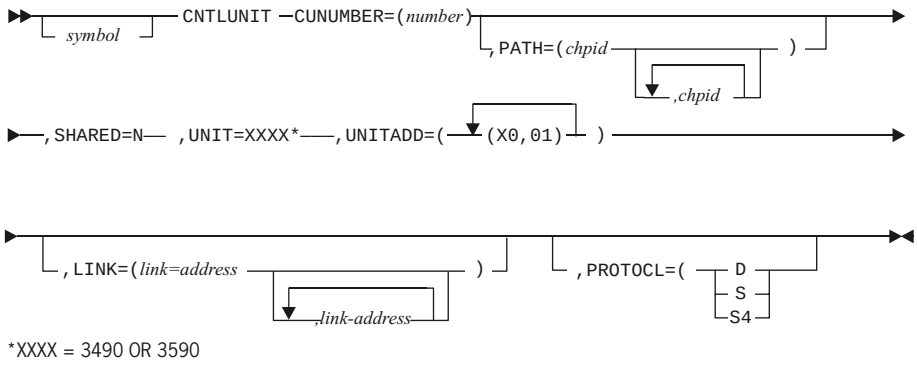
A generic name is automatically assigned during a SYSGEN process to each collection of drives having similar allocation characteristics. The values specified in the UNIT, MODEL, and FEATURE parameters of the IODEVICE macro determine the allocation characteristics. The unit name assigned to 3590 device types is 3590-1.

IOCP Generation

For processors that require an IOCP generation, the IOCP generation must be performed following the rules specified for a system generation. The CNTLUNIT macro defines the construction of the UCWs.

Figure 2-4 shows UCW construction.

Figure 2-4. UCW Construction



Notes:

1. Specify SHARED=N for the T9x40. The T9x40 uses block multiplexing that is not consistent with shared UCWs.
2. For more information about IOCP generation, refer to the IOCP documentation.

VolSafe Implementation

To implement VolSafe for the T9840 Tape Drives:

- Define scratch subpools of VolSafe media cartridges so that they match those in the installation's tape management system one-for-one.
- Define VolSafe drives with a unique esoteric name that points to VolSafe media cartridge pools.
- Restrict VolSafe media cartridges to drives under VolSafe firmware control.

Note: HSC uses SCRPOOL and TAPEREQ commands to accomplish the above tasks. For more information, refer to the HSC documentation.

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Multi-platform Support Planning 3

Multi-platform systems are systems that comply with industry standards, Open-Systems Architecture (OSA), and Open-Systems Interconnection (OSI). Such systems can be connected with other systems that also comply.

Multi-platform Data Connectivity

T9x40 Tape Drives connect to a multi-platform host by:

- Fibre Channel (FC) connection, in the following topologies:
  - Point-to-point
  - Arbitrated loop
  - Fabric
- Direct small computer system interface (SCSI) connection from the host to T9x40 drives

Supporting T9x40 Tape Drives with a multi-platform host requires that the host is running a specific level of operating system and/or host-based application; for example, a Cray Research host must be running, at a minimum, UNICOS 8.0.3.1.

For information about host software and hardware requirements, contact your StorageTek representative, host manufacturer, or application vendor. Customers and partners with a login ID and password can navigate to Connectivity on the e-Partners Site. See "Additional Information" on page xiv.

Multi-platform Control Connectivity

Multi-platform host control connections can be:

- Networked to a UNIX-based workstation with StorageTek Automated Cartridge System Library Software (ACSLS).
- Networked to another host with:
  - StorageTek Host Software Component (HSC) software
  - StorageTek LibraryStation software
  - Third-party library manager programs

ACSLS Requirements

T9840A Tape Drives require ACSLS 5.2.1 or higher.

T9840B Tape Drives require ACSLS 6.0 or higher.

T9940A Tape Drive requires ACSLS 5.3.2 or higher.

T9940B Tape Drives require ACSLS 6.01 (with PUT0201or SPE 0203) or higher.

Note: T9x40 Tape Drives attached to L5500 ACS require ACSLS 6.01 or higher.

A UNIX-based server running ACSLS provides diverse computing platforms access to a StorageTek library. Hosts such as Cray, Bull, Sun, Tandem, and Digital Equipment send control commands such as mount requests over a network to the server. ACSLS interprets the mount requests and controls the library robotics accordingly. Data travels between the hosts and the library on separate data paths.

For more information about ACSLS, customers and partners with a login ID and password can connect to the Customer Resource Center. See "Additional Information" on page xiv.

LibraryStation Requirements

T9840A Tape Drives require LibraryStation 3.1 and HSC 2.1.

T9840B and T9940A Tape Drives require LibraryStation 4.0 and HSC 4.0.

T9940B Tape Drives require LibraryStation 4.1 and HSC 4.1.

LibraryStation is MVS-based library control software that enables multi-platform hosts to share an MVS-based library. LibraryStation is used in conjunction with HSC. It allows a multi-platform host that has no direct connection to a library to access the library through a host-to-host connection.

For more information about LibraryStation, customers and partners with a login ID and password can connect to the Customer Resource Center. See "Additional Information" on page xiv.

Application Changes Planning 4

Most tape programs can be used on T9x40 Tape Drives without any changes; however, consider the following:

Application Conversion Verification

Transferring the data correctly is the highest priority in the migration process. Tape input/output (I/O) that was written at the device level might require modification to take advantage of functions available with T9x40 drives.

Application personnel might have to:

- Set up the data test plan so that project control personnel can monitor the data migration.
- Produce file copies with IEBGENER in MVS or another utility that provides similar functions. Use the copies in the early stages of the migration to ensure integrity before production-controlled migration of the tape data begins.
- Process test jobs with real test data.
- Verify results with the production run of the same application.
- Run a tape-compare utility, such as IEBCOMPR (MVS).

Chapter 5, "Data Migration," discusses tape inventory migration and suggests tasks that support the migration plan.

Application Considerations

Most of the following information is unique to tape I/O programming and applications.

Sense Bytes

T9x40 drives operate with expanded sense bytes to support error recovery procedure programs. The control unit portion of T9x40 drives handle many of the error recovery procedures. Programs that refer to sense bytes might require modification.

Update in Place

Programs that rewrite or update in place require an MVS/SYNAD routine. T9x40 drives do not support rewrite, so avoid using this type of program. If such programming already exists and requires modification for T9x40 drives, consider the following characteristics:

- The control unit sequence checks the blocks during read, write, and space block operations, and these programs fail if the block sequence is altered.
- The block ID is not transferred to the system during a read operation unless explicitly requested by a NOTE macro.

Write-validity-check Option

The write-validity-check option (tape-write-immediate mode) is for an application such as a database log facility that requires a block to be placed on tape and verified before it can proceed. The channel is released when the block is in the buffer, but device-end is not sent to the system until the read-back-check operation during the write is complete. Call the write-validity-check option by specifying OPTCD=W in the data control block (DCB) macro or the DCB parameter of the DD statement in MVS.

Device-end is not sent to the system until the read-back-check operation is complete, so use the write-validity-check option only for applications that require synchronous write-verify and can tolerate lower performance. Other applications can use direct access storage device (DASD) logging as an alternative.

Device-type Dependencies

Programs that perform certain functions might not provide the expected results when they run on a T9x40. Some of the program functions that might depend on the device type and might need changes are:

- Accounting routines (SMF)
- Device-dependent parameters such as the DEVD parameter of the DCB macro
- Dynamic allocation (SVC 99)
- Environmental record editing and printing (EREP) log tape analyzers
- Interrupt routines
- Job control language (JCL) inspection routines
- Non-StorageTek vendor software
- Programs that call data security ease (DSE)
- Stand-alone programs.

Data Security Erase

In normal operation, DSE writes random data that erases the tape. Pseudo DSE operation writes a control block that defines the end of usable data. Programs using the DSE channel command word (CCW) should issue a Rewind or Rewind/Unload command after the DSE. Any command that attempts to read over the random data or past the DSE control block will receive an error message. If the tape must move to a point before the DSE, use high-speed search (Locate Block command) with a Read Block ID command after the Rewind command.

Note: Running a DSE on a T9940 might take longer than the longest value possible for the Missing Interrupt Handler (MIH) timer. Running a pseudo DSE is an option in this case.

Do not degauss (bulk-erase) a T9x40 media cartridge. Degaussing erases the servo tracks written by the factory and renders the media cartridge unusable.

Execute Channel Program

On occasion, execute channel program (EXCP) programming is used in tape application programs. If the program is modified for the T9x40, the T9x40 uses channel command retry protocol in response to certain unexpected circumstances. Channel command retry repeats the channel command from the CCW that contains the command currently being processed. Do not write programs that modify tape CCWs or data areas before receiving a device-end from the CCW string.

Enhanced LZ-1 Data Compression

The control unit function provides enhanced LZ-1 to support the data compression function. For standard tape processing, the following rules apply to data compression.

- Data compression is invoked automatically for Read Forward or Read Buffer commands as required by the data format. LZ-1 is the default mode on the T9x40 system. Not all control programs support read-opposite recovery or can support it in all instances. This recovery also degrades performance because the procedure requires two additional commands for each original Read Backward command.
- Data compression is not recommended for encrypted data because the resulting compression ratio might be less than one. In general, data compression achieves a higher ratio if the logical block is not processed by compressing a transformation cipher algorithm (within the host).

- For standard tape processing, when the host software invokes data compression, the function invokes for all logical blocks within a data file (for example, between any two non-successive tape marks). Also data compression is invoked for all files on a volume (excluding header and trailer label groups) and for all volumes in an aggregate.

Auto Blocking

T9x40 drives use the equivalent of the auto-blocking feature. This feature cannot be disabled and could lead to performance degradation with applications that utilize the read-backward command, such as IMS Database Recovery.

Note: The auto-blocking feature requires the use of read-opposite recovery for applications that use the read-backward command.

Missing Interrupt Handler

When you install T9x40 drives, review the missing interrupt handler (MIH) value. The recommended value for the T9840 in both 3490 and 3590 emulation is 50 minutes; for the T9940 it is 180 minutes. You might have to adjust this value to meet the needs of your environment and the kind of operations you perform on the T9x40. The objective is to select a value that allows normal I/O operations to complete but also ensures that system performance does not degrade while waiting for failed I/O operations to end.

The normal progression of an I/O operation from the host channel is the issuance of a command followed by completion. Delayed completion might indicate equipment failure. Most operating systems monitor outstanding I/O operations and take exceptional action when an operation exceeds a set time limit. In this way, the system detects failures early and reallocates resources.

Different devices require different time limits; no one value works for all. However, a value can usually be assigned for a class of devices or an address range. Some devices, such as the T9x40, can have a wide variance of normal completion times for a command. While a read of block zero takes less than a minute, a data security erase (DSE) on a T9840A might take 40 minutes to complete. Setting the value too low can result in termination of a normal operation.

Note: Running a DSE on a T9940 might take longer than the longest value possible for the MIH timer. Running a pseudo DSE is an option in this case. See "Data Security Erase" on page 4-3.

Current MVS releases support the FA (Read Device Characteristics) command with T9x40 drives in both 3490 and 3590 modes. This results in the MIH being set to 50 minutes, overriding the value specified in sys1.parmlib. For processors that use MVS, you can find additional information about the MIH in the appropriate MVS/ESA initialization and tuning manuals.

Data Migration

5

This chapter contains instructions for analyzing the composition of the tape inventory and for migrating data to the T9x40.

Tape Inventory Analysis

The tapes in most inventories can be categorized according to how they are used. The criteria include life cycle, security requirements, special handling, or various application dependencies, such as capacity and performance. Table 5-1 shows the categories and characteristics of a tape inventory.

Table 5-1. Tape Inventory Analysis

Tape Category	Tape Characteristics
Archive	Contains records held for historical, legal, regulatory, or disaster-recovery purposes
	Uses a retention period of usually more than a year and tapes often stored off-site
	Processes tapes in locations other than the site where they were created
Interchange	Is prepared for use in other locations
	Is prepared for use in other computer systems or for special purposes like microfilm production
	Is prepared at another location for use on the local system, for example, tapes created on data collection equipment
Disk backup	Is created in normal backup jobs for disk drives
	Represents several generations stored in a tape inventory
	Is used to recover files in the event of a program or system error or other malfunction. The restore function is seldom used but when it is the integrity of the copied data is usually critical.
	Uses files with a high turnover rate and may require interchange with other sites

Table 5-1. Tape Inventory Analysis (Continued)

Tape Category	Tape Characteristics
Journal	Contains transactions recorded against another data set Allows their companion data sets to be reconstructed by applying the journal data to a previous version of the companion data sets Is used in database and online systems applications
Scratch	Is referred to as the scratch pool and contains no active data Is used for creating new files during normal processing when the data is kept at job-step or job-end Provides a regular flow of new, unused tapes entering a tape inventory to be used for growth and replacement of old tapes, which is important in determining the number of media cartridges to purchase
Process	Is created during periodic execution of an installation's application programs Represents the highest volume of files in a tape inventory; for example, multiple generations of a tape master file Contains a range of criteria and time frames; most common is the daily, weekly, and monthly processing cycles

Data Migration Sequence

Another aspect of planning is to determine the sequence to follow during the migration process, based on the following considerations:

Archive Tapes All new archive volumes are created on the media cartridge with the understanding that some may be recalled by a processing agency that requires a tape reel. In those instances, the cartridge must be copied onto a tape reel before shipment. The existing archive tapes are converted to take advantage of space and data integrity improvements with the same understanding.

DASD Backup Tapes These tapes are converted easily during the first phase of the plan and would quickly reduce tape inventory space requirements and improve performance. Large-scale data transfer is involved, which lends itself to device and data transfer verification with familiar utilities.

Interchange Tapes These tapes do not migrate initially. They require selective conversion based on the ability of the interchange site to operate with the media cartridge and format.

Journal Tapes A read-back-check operation is always used for journal tapes after a record is written to ensure the accuracy of the data. T9x40 drives are buffered, so use the write-validity-check option for these tapes. See "Write-validity-check Option" on page 4-2 for more information.

Most journal tapes usually do not demand this high level of integrity. For the journal tapes that do require a high level of integrity the journal tape jobs could remain on the original drives until the application is modified accordingly.

Process Tapes These tapes are converted either selectively or at the normal process rate. Application programming personnel or applications staff who usually audit application job flow may monitor the transition. This category accounts for most of the conversion/migration workload.

Scratch Tapes Scratch tapes are referred to as the "scratch pool" and contain no active data. They are used for the creation of new files during normal processing when the data is kept at job-step or job-end. Scratch tapes are often a regular flow of new, unused tapes being introduced into the tape inventory for growth and replacement of old tapes. This may be important in determining the number of media cartridge to be purchased.

Plan for a complete migration and conversion of all possible tapes, except for interchange and journal tapes. The total number of media cartridges required is equal to the sum of process, DASD backup, scratch, and archive tapes in the current inventory with possible additions for growth.

Data Migration Strategy

T9x40 Tape Drives write data in a unique format that is not compatible with an 18- or 36-track longitudinal format or with a helical format. T9x40 media cartridges are physically unique and will not load into a 4480, 4490, 9490, or SD-3 tape drives. Likewise, cartridges from these drives will not load into T9x40 Tape Drives.

For this reason, the data migration strategy of "old file in/new file out" is inappropriate for T9x40 drives. T9x40 Tape Drives cannot append data to existing 18-track, 36-track, or helical-scan media.

Instead, copy the data to T9x40 media cartridges and recatalog the newly-created data set as a 3490 or 3590 device type. To use the capacity of the T9x40 media effectively, use multi-volume files as input.

HSC and NCS Migration

To migrate data on systems that use StorageTek's Host Software Component (HSC) or Nearline Control Solution (NCS) software, refer to the following guides:

- *HSC System Programmer's Guide*
- *HSC Configuration Guide*
- *NCS Installation Guide*

Customers and partners with a login and password can access the above guides online on the Customer Resource Center. See "Additional Information" on page xiv.

T9940A to T9940B Migration

A

This appendix contains supplemental information useful to the planning and migration process from T9940A Tape Drives to T9940B Tape Drives; and, managing data when both T9940A and T9940B Tape Drives co-exist.

The general planning and migration process tasks covered in previous chapters of this guide continue to be your primary guidelines.

Introduction

This section summarizes the differences and similarities between the T9940A and T9940B Tape Drives and the T9940 Media Cartridge.

Tape Drive

Both T9940A and T9940B Tape Drives use the same T9940 Media Cartridge, but each writes data to the tape media in different data density formats. The T9940A writes data in a 288-track (low-density) format; whereas, the T9940B writes data in a 576-track (high-density) format. The T9940A can neither read, nor append media cartridges written by a T9940B drive. The T9940B can read, but not append media cartridges written by a T9940A drive.

Each drive can distinguish between media cartridges written in either density format. The T9940A, when loaded with a media cartridge containing data written in the high-density format displays a "Ready H" message. The T9940B, when loaded with a media cartridge containing data written in the low-density format displays a "Ready L" message. Either drive, when loaded with a media cartridge containing data written in its matching density format, displays the normal "Ready U" message. Either drive, when loaded with file-protected media cartridge of either density format, displays "Ready F". The data density format detection is masked by the locked write protect switch detection.

Media Cartridge

The same T9940 Media Cartridge, with the Media ID label "P", is used by both the T9940A and T9940B Tape Drives. When written by the T9940A Tape Drive in a 288-track (low-density) format; the media cartridge can hold 60 GB. When written by the T9940B Tape Drive in a 576-track (high-density) format; the media cartridge can hold 200 GB. Without an additional label on the media cartridge, it is impossible to visually distinguish any difference between media cartridges written by one drive versus the other.

T9940 Media Migration/Management

This section summarizes the unique challenges in migrating and/or managing T9940 media cartridges that can contain either of two different data formats, and can be loaded into either of two different tape drives.

Several scenarios and contingencies must be considered when planning data migration with T9940A and T9940B Tape Drives, such as type of data, tape drive population, media cartridge inventory, and extra management measures.

Data

The type of data you are managing is an important consideration. For instance, archival data, currently contained on media cartridges written by T9940A drives can be read by T9940B drives. Therefore, you do not necessarily have to migrate that data to the high-density format of the T9940B. However, data that will continue to be amended or revised, probably should be migrated, or some T9940A drives be retained. The potential varieties of data issues are beyond the scope of this guide. Each different data issue must be evaluated in concert with all other considerations.

Drive Population

Since the T9940B Tape Drive can read media cartridges of either data density, it would seem only natural that drive population would be predominately, if not totally T9940B. You can even perform the actual migration process with only T9940B drives. When some quantity of T9940A Tape Drives are retained, and co-exist with T9940B Tape Drives, they would, of course, be limited to read/write tasks of media cartridges in the low-density format.

Media Cartridge Inventory

Media cartridge inventory is another important consideration. Although media cartridges written in the low-density format can be read by T9940B drives, a reduction to approximate one third the number of media cartridges is possible if the data was migrated. The T9940 Media Cartridge, when written in the high-density format of the T9940B can hold 200 GB versus 60 GB when written in the low-density format by the T9940A. Therefore, you could migrate at least three full media cartridges of low-density data to only one media cartridge in the high-density format. Total number of media cartridges for the same amount of data can be dramatically reduced with migration to high-density format.

If media cartridge inventories of both density formats are to be maintained, additional management measures are necessary, such as separate inventories and/or sub-pools. This can be even more critical if both T9940A and T9940B drives co-exist in the same system.

Extra Management Measures

Extra management measures essentially involve creation and management of separate media pools/sub pools for T9940 media cartridges. This is similar to steps taken in the past, when migrating and/or managing 18- track and 36-track cartridge subsystem.

Guidelines for creation and maintenance of pools/sub-pools are located in ACSLS and NCS software documentation. See "Related Publications" on page xii.

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Glossary

This glossary defines new or special terms and abbreviations used in this guide.

Many of the definitions are taken from the *IBM Dictionary of Computing*. The following letters in parentheses following the definition indicate the source of the definition:

(A) *The American National Standard Dictionary for Information Systems*, ANSI X3.172-1990, copyright 1990 by the American National Standards Institute (ANSI).

(E) The ANSI/Electronic Industries Association (EIA) Standard-440-A, *Fiber Optic Terminology*.

(I) The *Information Technology Vocabulary*, developed by Subcommittee 1, Joint Technical Committee 1, of the International Organization for Standardization and International Electrotechnical Commission (ISO/IEC/JTC1/SC1).

(IBM) *The IBM Dictionary of Computing*, copyright 1994.

(T) Draft international standards committee drafts, and working papers being developed by the ISO/IEC/JTC1/SC1.

A

access time The time interval between the instant at which a call for data is initialized and the instant at which the delivery of data is completed. (T)

ACSLS *See* automated cartridge system library software.

address A character or group of characters that identifies a register, a particular part of storage, or some other data source or destination. (A)

alphanumeric Pertaining to data that consists of letters, digits, and usually other characters, such as punctuation marks. (T) (A)

applications software Software that is specific to the solution of an application problem. (T)

automated cartridge system library software (ACSLS) UNIX-based software that allows multiple computing platforms to access a Nearline automated cartridge system (ACS).

B

backup Pertaining to a procedure, technique, or hardware used to recover lost or destroyed data or to keep a system operating. (T)

bin *See* Cartridge Scratch Loader (CSL)

block A string of data elements recorded or transmitted as a unit. The elements may be characters, words, or physical records. (T)

buffer A routine or a storage used to compensate for a difference in rate of flow of data, or time of occurrence of events, when transferring data from one device to another. (A)

C

cabinet A protective cover for one or more tape drives. The 9741 cabinet houses up to 20 tape drives and associated equipment.

cartridge tape A storage device that consists of magnetic tape on supply and take-up reels, in a protective housing. (IBM)

See media cartridge T9x40 cartridges.

Cartridge Scratch Loader (CSL) A device attached to the T9840A Tape Drive that automatically feeds cartridges to the drive. Cartridges are manually placed in an input bin, and after use, are deposited automatically in an output bin.

check Detection of an error condition or test for correct condition.

cleaning cartridge A cartridge device containing material used to clean the tape path in a transport.

code Instructions written for a computer. (IBM)

condition One of a set of specified values that a data item can assume. (IBM)

configuration The manner in which the hardware and software of an information processing system are organized and interconnected. (T)

connector An electrical part used to join two or more other electrical parts. (IBM)

CSL *See* Cartridge Scratch Loader.

D

data compression Saving storage space by eliminating gaps, empty fields, redundancy, or unnecessary data to shorten the length of records or files.

drive A device for moving magnetic tape and controlling its movement. (IBM)

E

emulation The use of programming techniques and special machine features to permit a computing system to execute programs written for another system. (IBM)

enterprise A representation of the goals, organizational structure, business processes, and information resources and requirements of an enterprise. (IBM)

Enterprise Systems Connection (ESCON) A set of IBM products and services that provide a dynamically-connected environment within an enterprise. (IBM)

environmental requirement Any of the physical conditions required for the protection and proper operation of a functional unit; the requirement is usually specified as a nominal value and a tolerance range. For a device, there may be more than one set of environmental requirements; for example, one set for transport, another for storage, and another for operation. (T) (A)

error A discrepancy between a computed, observed, or measured value or condition and the true, specified, or theoretically correct value or condition. (I) (A)

ESCON *See* Enterprise Systems Connection.

F

fabric The Fibre Channel topology similar to a telephone switch in that the initiator of a "call" to the receiving port simply provides the receiver with the port address, and the fabric routes the transmission to the correct port. A fabric differs from a point-to-point or arbitrated loop topology in that it provides for interconnections between ports without having a point-to-point connection. The fabric also serves as a media-type converter.

FC *See* Fibre Channel.

fiber optics The branch of optical technology concerned with the transmission of radiant power through fibers made of transparent materials such as glass, fused silica, and plastic. (E)

Fibre Channel (FC) The ANSI standard that defines an ultra high-speed, content independent, multi-level data transmission interface that can support multiple protocols simultaneously, support connectivity to millions of devices over copper and/or fiber optic physical media, and provides the best characteristics of both networks and channels, over diverse topologies.

format In programming languages, a language construct that specifies the representation, in character form, of data objects in a file. (I)

frame *See* cabinet.

G

GB Gigabyte, or 10^9 bytes.

H

hardware All or part of the physical components of an information processing system, such as computers or peripheral devices. (T) (A)

host The primary computer on a network, with which other computers interact.

host interface Interface between a network and host computer. (T)

Host Software Component (HSC) Mainframe-based robotic control software for MVS- and VM-based systems.

HSC *See* Host Software Component

I

initialization The operations required for setting a device to a starting state, before the use of a data medium, or before implementation of a process. (T)

Initial Program Load (IPL) The initialization procedure that causes an operating system to commence operation.

input/output (I/O) Pertaining to a device, process, or channel involved in data input, data output, or both. (IBM)

interface Hardware, software, or both, that links systems, programs, or devices. (IBM)

I/O *See* input /output.

IPL *See* Initial Program Load.

J

JCL *See* job control language

job control language (JCL) A control language used to identify a job to an operating system and to describe the job's requirements. (IBM)

M

magnetic tape A tape with a magnetizable layer on which data can be stored. (T)

media cartridge A storage device that consists of magnetic tape in a protective housing. StorageTek T9840 media cartridge contains two reels. StorageTek T9940 media cartridge contains one reel.

medium A physical material in or on which data may be represented. (IBM)

menu A list of options displayed to the user by a data processing system, from which the user can select an action to be initiated. (T)

microcode A code, representing the instructions of an instruction set, that is implemented in a part of storage that is not program-addressable. (IBM)

multi-platform systems *See* open systems.

Multiple Virtual Storage (MVS) IBM's Multiple Virtual Storage, consisting of MVS/ System Product Version 1 and the MVS/370 Data Facility Product operating on a System/ 370 processor. (IBM).

Multiple Virtual Storage/Enterprise Systems Architecture (MVS/ESA) An extended version of IBM's MVS.

MVS *See* Multiple Virtual Storage.

MVS/ESA *See* Multiple Virtual Storage/ Enterprise Systems Architecture.

N

NCS *See* Nearline Control Solution.

Nearline The StorageTek family of tape-library information storage and retrieval products.

Nearline Control Solution (NCS) An MVS-based Nearline software product that supports multiple MVS images sharing a library complex.

O

offline Neither controlled by, nor communicating with, a computer. (IBM)

online Pertaining to the operation of a functional unit when under the direct control of the computer. (T)

open systems Systems whose characteristics comply with standards made available throughout the industry and that therefore can be connected to other systems complying with the same standards. (T)

In T9x40 Tape Drives, a drive that has an FC or SCSI interface.

operating system Software that controls program execution.

P

performance One of two major factors, together with facility, on which the total productivity of a system depends. Performance is largely determined by a combination of throughput, response time, and availability. (IBM)

port A specific communications end point within a host. A port is identified by a port number. (IBM)

protocol A set of semantic and syntactic rules that determines the behavior of functional units in data communication. (I).

R

release A distribution of a new product or new function and fixes for an existing product. (IBM)

resident Pertaining to computer programs or data while they remain on a particular storage device. (T)

restore To return a backup copy to the active storage location for use. (IBM)

rewind To move tape from the take-up hub to the supply hub. (IBM)

S

SCSI *See* small computer system interface.

small computer system interface (SCSI) An ANSI standard for controlling peripheral devices by one or more hosts.

software All or part of the programs, procedures, rules, and associated documentation of a data processing system. Software is an intellectual creation that is independent of the medium on which it is recorded. (T)

state The condition of a device, such as online or offline.

T

tape *See* magnetic tape *and* media cartridge.

tape drive A device for moving magnetic tape and controlling its movement. (T)

V

VolSafe A T9840 mode of operation and special media cartridge that allows data *only* to be appended to the tape media; existing data is not overwritten.

VOLSER A six-character alphanumeric label used to identify a volume.

W

write protection Restriction of writing into a data set, file or storage area of a user or program not authorized to do so. (IBM)

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