August 1978

This document explains the capabilities and usage of the two Disk Save and Compress (DSC) utilities that copy Files-11 disk files to either disk or to tape, and from tape back onto disk. It is intended for users with some VAX-11/780 experience and some familiarity with VAX/VMS operating system concepts and procedures.

VAX-11
Disk Save and Compress
User's Guide

Order No. AA-D739A-TE

SUPERSESSION/UPDATE INFORMATION:	This is a new document for this release.
OPERATING SYSTEM AND VERSION:	VAX/VMS V01
SOFTWARE VERSION:	VAX/VMS V01

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First Printing, August 1978

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PREFACE

MANUAL OBJECTIVES

The objective of this guide is to explain the capabilities and usage of the two Disk Save and Compress (DSC) utilities that copy Files-11 disk files either to disk or to tape, and from tape back onto disk. Users learn how and to what extent they are able to regulate the transfer of data during a copy operation.

INTENDED AUDIENCE

This guide is intended for any person who has the responsibility or the need to back up or reconstruct a Files-11 disk. System operators, system managers, and programmers are all likely, at some point, to need to use DSC.

STRUCTURE OF THIS DOCUMENT

The Disk Save and Compress User's Guide is organized into four chapters, as follows:

- Chapter 1 explains what DSC is and what it does. This chapter also tells you how to initiate and terminate DSC, and how to request DSC operations.
- Chapter 2 defines how you control copy operations with a DSC command and associated qualifiers.
- Chapter 3 explains the steps that DSC performs during each of the four data transfer operations.
- Chapter 4 provides an explanation of each DSC-generated message.

ASSOCIATED DOCUMENTS

The VAX-11 Information Directory lists and describes all the documents that you may need to refer to in the course of performing DSC functions.

As a DSC user, you should have a general understanding of the VAX/VMS operating system. Specifically, you must have a conceptual knowledge of Files-11 on-disk structure and a familiarity with VAX-11/780 bootstrap and mounting procedures. Listed below are the major areas

of interest to DSC users and the documents associated with each area.

- General background:
  - VAX/VMS Summary Description
  - VAX/VMS Primer
- Files-11 structure:
  - Introduction to VAX-11 Record Management Services
  - VAX-11 Record Management Services Reference Manual
- Bootstrap and mounting procedures:
  - VAX/VMS Operator's Guide
  - VAX/VMS System Manager's Guide
  - VAX-11 Software Installation Guide

CHAPTER 1

INTRODUCTION

The VAX-11 Disk Save and Compress (DSC) utility programs DSC1 and DSC2 copy Files-11 disk files to either disk or to tape, and from tape back onto disk. At the same time, the programs reallocate and consolidate the area used for data storage: both programs concatenate disk files and their extensions into contiguous data blocks and reduce the required number of retrieval pointers and file headers.

Strictly speaking, a DSC copy operation is not complete until the data involved in the transfer is restored to disk. After a disk-to-disk copy operation, you can gain access to the contents of the new disk file immediately after DSC copies the data from the original disk.

After a disk-to-tape operation, however, you cannot gain access to the data while it is on tape, because DSC stores data on magnetic tape in a format recognizable only to DSC. To gain access to this data, you must perform a second copy operation by submitting the tape back to DSC, which reformats the tape's contents and then reconstructs the Files-11 disk. Because of the special format that DSC requires to read a tape, DSC accepts only tapes that it created during a disk-to-tape operation.

You can thus use DSC either to write the contents of one disk to another disk, or to transcribe the contents of a disk to magnetic tape for permanent storage, or to reconstruct a Files-11 disk from a magnetic tape.

A Files-11 disk can be formatted as a structure level 1 volume or as a structure level 2 volume. Files-11 Structure Level 1 format allows users to transport disks between VAX/VMS systems and RSX-11M, RSX-11D, and IAS systems. That is, structure level 1 disks can be created on a VAX/VMS system and transported to an RSX-11M, RSX-11D, or IAS system, and vice versa. Files-11 Structure Level 2 format is not transportable; that is, structure level 2 disks can run only on VAX/VMS systems. The DSC1 utility program copies structure level 1 disks and the DSC2 utility program copies structure level 2 disks. Throughout this document, the term "DSC" applies to both structure level 1 and structure level 2 disks.

In addition, an entirely self-contained, stand-alone version of the DSC2 utility program is available. This version of DSC2 enables users with one-disk systems to back up and restore their system disk. Stand-alone DSC2 also enables users to create a system disk when the VAX/VMS operating system distribution medium is a magnetic tape.

This document describes only the data transfer operations performed by DSC. Users responsible for installing or backing up the VAX/VMS operating system should refer to the VAX-11 Software Installation Guide and the VAX/VMS Operator's Guide for the procedures that must be performed before initiating DSC.

1.1 DSC TRANSFERS

DSC transfers data from a Files-11 disk to either disk or tape by copying only blocks that are allocated to active files. Data files that are scattered randomly over the disk are read and written to a new medium without the intervening spaces. As a result, individual files are closer together, and the space available for new files is consolidated into one contiguous area, thereby eliminating wasted space between files and improving access efficiency.

If the contents of one disk are transferred to a disk with a larger storage capacity, the new disk is constructed with the attributes of the original disk, except that the additional storage space is available for use.

In addition to using DSC to copy files to disks for compression or to tape for storage, you can use DSC to recover from a hardware malfunction that renders a portion of the disk unreadable. If DSC cannot read the contents of a block allocated to a data file without causing a read error, it copies the garbled contents to the output device and generates a warning message that labels the garbled data block. The contents can then be accessed and corrected.

The DSC data transfer process begins with data on a disk and ends with data on a disk in compressed form. Copying files from disk to disk is a direct, one-step operation that consists of two data transfers:

- Data is read from disk
- Data is written to disk

Copying files from disk to tape is generally not considered a complete operation, because the data is not usable on tape; it must be copied back to disk before you can gain access to it. Therefore, a tape operation is considered a two-step operation that consists of four data transfers:

Step 1:

- Data is read from disk
- Data is written to tape

Step 2:

- Data is read from tape
- Data is written to disk

DSC does not support a data transfer from tape to tape.

Chapter 3 provides detailed information on each type of data transfer effected by DSC.

1.2 INITIATING AND TERMINATING VAX-11 DSC

To initiate DSC1 or DSC2, enter the appropriate command line following the system prompt ($).

To invoke DSC1 to execute a function and then return control directly to the command interpreter, enter:

```
$MCR DSC1 command-string
```

Similarly, to invoke DSC2, enter:

```
$MCR DSC2 command-string
```

You can thus enter a single command for execution: DSC is loaded, the command is executed, and control returns to the command interpreter.

To invoke DSC and pass control to it, enter either one of the following commands, as appropriate:

```
$ MCR DSC1

$ MCR DSC2
```

This form of command does not execute a function; rather, it makes DSC available for executing more than one function without returning control to the command interpreter. When invoked using this form, DSC responds with the prompt:

```
DSC>
```

This prompt indicates that DSC is ready to accept a DSC command.

To terminate DSC and return control to the command interpreter after all DSC commands have been completed, enter CTRL/Z.

1.3 INITIATING AND TERMINATING STAND-ALONE DSC

Section 1.3.1 presents the bootstrap procedures for running stand-alone DSC. Section 1.3.2 shows how to terminate this version of DSC.

1.3.1 Initiating Stand-Alone DSC

The stand-alone version of DSC is bootstrapped into memory from the diagnostic floppy diskette labeled ZZ-ESZCC-A0.

The stand-alone DSC bootstrap procedure is as follows:

1. Load the diagnostic diskette into the VAX-11/780 console floppy drive.
2. Place the AUTORESTART switch, located on the central processor's control panel, in the ON position.
3. Place the DC ON/OFF switch, located inside the VAX-11/780 cabinet on the LSI-11 control panel, in the OFF position.
4. Return the DC ON/OFF switch to the ON position.

This procedure initiates a system restart and loads the console program from the diskette as indicated by the following message, which is displayed at the console terminal:

```
CPU HALTED,SOMM CLEAR,STEP=NONE,CLOCK=NORM
RAD=HEX,ADD=PHYS,DAT=LONG,FILL=00,REL=00000000
INIT SEQ DONE
HALTED AT 00000000
(RELOADING WCS)
LOAD DONE, 00003200 BYTES LOADED
VER: PCS=01 WCS=03-10 FPLA=03 CON=PX03-08
(AUTO-RESTART)
CPU HALTED
INIT SEQ DONE
```

The console program in turn loads the stand-alone software. Loading takes approximately 1 minute and 30 seconds. At the completion of loading, the console program displays the message:

```
LOAD DONE, 00020000 BYTES LOADED

VAX/VMS DSC2, VERSION A.1 30-MAY-78

DSC>
```

The DSC2 utility program is now running, and you can enter a DSC command after the prompt DSC>.

1.3.2 Terminating Stand-Alone DSC

You terminate stand-alone DSC at the console terminal by entering commands that halt the processor.

The halt procedure is as follows:

1. After the prompt DSC>, enter (CTRL/P).
2. When the prompt >>> is displayed, type HALT and press the carriage return key.

The following message is displayed after the processor is halted:

```
HALTED AT ........
```

This message shows you the contents of the program counter at the time the processor halted.

1.4 DSC COMMAND FORMAT

DSC commands are entered in the following format:

```
outdev:[filelabel][/qualifier]=indev:[filelabel][/qualifier]
```

outdev:
The physical device(s) to which data is transferred. The format of outdev: is AAAn: where AAA are the ASCII characters that specify the device abbreviation followed by the alphabetic controller designator, n is the optional 1-digit (octal) unit number, and the colon (:) is the device name terminator. If the controller designator is omitted, "A" is the assumed default; if

the device number is omitted, 0 is the assumed default. If you list more than one tape drive, the device names must appear in succession, separated by commas, before you specify any other command parameters.

[filelabel]
The 1- to 12-character alphanumeric name identifying the tape file that is created (output) in a disk-to-tape data transfer. If a file label is not specified when a tape file is created from disk, the disk volume label is used as the identifier (see Section 2.1). When DSC copies from disk to disk, it uses the label of the input disk as the label for the output disk and ignores any label specified in the command string.

[/qualifier]
One or more of the optional qualifiers described in Sections 2.2 through 2.8.

indev:
The physical device(s) in the format AAAn: from which data is copied (see outdev: above, and Section 3.3).

[filelabel]
The 1- to 12-character alphabetic name identifying the DSC-created tape file that is to be transferred (input) to disk. If the command string does not specify an input file label for a tape-to-disk operation, DSC transfers the first file found on the tape (see Section 2.1).

[/qualifier]
One or more of the optional qualifiers described in Sections 2.2 through 2.8.

For example:

```
DSC>MTA1:,MTA2:SYSFILE/DENS=1600=DBA0:
```

In this example, DSC writes the contents of either an RP05 or an RP06 disk pack (DBA0) to two TE16 tape drives(MTA1 and MTA2). All the DBA0 disk files are stored in a single tape file labeled SYSFILE at a density of 1600 bits per inch. Usually several tape volumes are needed to hold the contents of one disk. DSC generates and assigns a volume label to each tape reel by taking the first four characters of the tape file label and appending two digits. The volume labels (used in future MOUNT commands) generated in this example are SYSF01 and SYSF02.

1.5 DSC DEVICES

Table 1-1 lists the devices you can use with DSC when DSC is under the control of the VAX/VMS operating system.

Table 1-1
Devices Used with DSC

Abbreviation	Type	Class
DM	RK06 or RK07 cartridge disk	Block-structured
DB	RP05 or RP06 disk pack	Block-structured
DR	RM03 disk pack	Block-structured
MT	TE16 9-track magnetic tape	Tape
DX	RX01 console floppy diskette	Block-structured

The stand-alone version of DSC supports only the mass storage device configurations shown in Table 1-2.

Table 1-2
Stand-Alone DSC-Supported Devices

Abbreviation	Type	Number Supported
DM	RK06 or RK07 cartridge disk	2
DB	RP05 or RP06 disk pack	2
DR	RM03 disk pack	2
MT	TE16 9-track magnetic tape	2
DX	RX01 console floppy diskette	1

Note that all output devices used by DSC must be mounted foreign (the VAX/VMS Command Language User's Guide, Part II, describes the MOUNT command in detail).

CHAPTER 2

DSC FILE LABELS, QUALIFIERS, AND OPTIONS

The DSC commands can optionally contain file labels and qualifiers. Some qualifiers can also take options. Table 2-1 lists the formats and uses of the qualifiers and applicable options.

Section 2.1 following the table discusses file labels, and Sections 2.2 through 2.8 discuss the individual qualifiers in detail.

Table 2-1
DSC Qualifiers and Options

Qualifier	Format with Option(s)	Description
Rewind qualifier	/RW	Rewinds magnetic tapes before execution of the current command (Section 2.2)
Bad Block qualifier	/BAD= {MAN / NOAUTO / MAN:NOAUTO}	Allows manual entry of bad block locations; can supplement or ignore the bad block file (Section 2.3)
Append qualifier	/AP	Appends a DSC file to a magnetic tape that already contains a whole DSC file (Section 2.4)
Nonmerge Mode qualifier	/NMG	Copies data from disk without consolidating all extensions of a file (Section 2.5)
Density qualifier	/DENS=1600	Creates magnetic tapes at 1600 bits per inch density (Section 2.6)
Compare qualifier	/CMP	Compares the input and output devices for differences (Section 2.7)
Verify qualifier	/VE	Copies data from the input device and performs a compare operation after data transfer (Section 2.8)

2.1 FILE LABEL

The file label identifies the data copied from a disk and stored on a set of tape volumes (a tape set). If you do not specify a file label when the output medium for a DSC operation is magnetic tape, DSC uses the volume label of the input disk as the file label of the tape set.

The file label can consist of from 1- to 12-alphanumeric characters. DSC uses the first nine characters to identify the tape file containing a disk's contents. Place the file label after the device specification and before any qualifiers. Terminate the file label by specifying either:

1. A qualifier
2. An equal sign (=), indicating the end of the output side of the command; or a carriage return, indicating the end of the command string

For example:

```
DSC>MTA1:,MTA2:SYSFILE=DBA1:
```

In this example, DSC uses the file label SYSFILE to identify the file on tape that contains the data to be copied from the specified input disk, DBA1.

The file label can optionally be used when restoring data to disk. If you enter the file label as part of the input specification, DSC searches the first tape for a file with the same name as the specified file label. When it finds the file, DSC transfers it to disk. If, however, you do not specify a file label, DSC transfers the first file it locates on the first tape. In both cases, using the Rewind qualifier (see Section 2.2) causes the tape to be rewound to its beginning before the search for the file starts.

For example:

```
DSC>DBA1:=MTA1:,MTA2:SYSFILE
```

Because the Rewind qualifier is not specified on the input side of the command line, DSC searches the first tape volume specified, MTA1, for a DSC file named SYSFILE. DSC begins the search at the current position of the tape. If DSC finds the header for SYSFILE in the first volume, it makes the data transfer. If it does not find the header on the first volume, however, DSC issues an appropriate error message and terminates the operation. If you entered the command without the file label, DSC searches, from the current position of MTA1, for the beginning of a DSC file and transfers the first file of disk contents it locates on tape drive MTA1, regardless of the file name. This file, being the first file encountered, may or may not be SYSFILE. Similarly, the tape may or may not have been positioned at the beginning of the tape. If the beginning of a DSC file is not found, DSC issues an appropriate message and terminates the operation.

2.2 REWIND QUALIFIER

The Rewind qualifier directs DSC to rewind the first magnetic tape of a tape set before performing any DSC operation. Subsequent tapes must be at the beginning-of-tape (BOT) position when DSC calls for them. The format of this qualifier is:

```
/RW
```

If you enter /RW as part of the input specification, DSC rewinds the first tape before the copy operation begins. If you specify a file label with /RW, after the tape is rewound DSC searches for the specified file of the disk from the beginning of the first tape volume. If you do not specify a file label, DSC transfers the first file encountered on the first volume. After a tape of a multivolume tape set has been copied, DSC rewinds it back to the BOT position and places it offline. If, however, the current file ends on the first or only volume of a set, the tape is positioned ready to read the next file on the input tape.

If you enter /RW as part of the output specification, DSC begins the copy operation by writing data at the beginning of the rewound tape. Thus, starting at the beginning of the tape, DSC overlays whatever data was contained on the tape. If you do not enter /RW with the output specification, and the tape is not at load point, DSC begins writing to the tape following the last end-of-file (EOF) block encountered (see Section 2.4). If the tape is at load point when you enter the command, and you are not specifying the Append qualifier (see Section 2.4), the tape is overwritten from its beginning regardless of whether you specify /RW. If the current file being copied extends beyond the first volume, that volume and all subsequent volumes of the set are rewound and unloaded as they are filled. Otherwise, the tape is left-positioned to append another file to the first volume of the set. If the end of the tape is sensed during the search for the last EOF block, the current command is aborted and DSC issues an appropriate error message.

For example:

```
DSC>MTA1:SYSFILE/RW=DBA1:
```

In this command, DSC rewinds the tape on drive MTA1 to its beginning before it writes and overlays any data contained on the tape. The contents of DBA1 are written to a single file identified as SYSFILE. DSC does not rewind the tape when the operation is finished unless the file extends to another volume. If the file does extend to another volume, DSC rewinds and unloads the tape. Each subsequent volume, including the last volume of the output tape set is rewound and unloaded.

In the following example, DSC restores a disk (DBA1) using a tape created by a previous command:

```
DSC>DBA1:=MTA1:,MTA2:SYSFILE/RW
```

DSC rewinds the first tape volume (on MTA1) and searches for a previously created DSC file labeled SYSFILE. If the file is found, DSC transcribes it. If the file is not found, DSC issues an error message and terminates the operation. Each volume of the tape set is rewound and unloaded when the data it contains has been copied.

2.3 BAD BLOCK QUALIFIER

The Bad Block qualifier is used with output disks to control DSC's use of bad block information.

This qualifier takes three options that let you either supplement the output disk's bad block file with manually entered bad block data, ignore the bad block file altogether, or exclusively use manually entered bad blocks.

The formats of the Bad Block qualifier and its options are:

```
/BAD=MAN
/BAD=NOAUTO
/BAD=MAN:NOAUTO
```

MAN
Allows manual entry of bad block data, which is included in the bad block file on the disk.

NOAUTO
Causes DSC to ignore the bad block descriptor on the disk, resulting in an empty bad block file.

MAN:NOAUTO
Causes DSC to treat only manually entered bad block data as the bad block file.

The Bad Block qualifier in no way affects the bad block descriptor, which is left after you run the BAD utility and INITIALIZE commands or the factory-recorded bad block information on RK06 or RK07 cartridges or RM03 disk packs. If you use the NOAUTO option, DSC ignores, but does not destroy, the bad block file (to which bad blocks are allocated). As a result, you can access the bad block file in subsequent DSC operations. When you specify the MAN or MAN:NOAUTO options with /BAD=, DSC responds with the following prompt:

```
DSC>BAD=
```

DSC issues this prompt after it accepts the command line but before it transfers the data.

After DSC issues the prompt, you can enter the locations of bad blocks. Enter bad block data immediately following the equal sign (=) as shown in the following format:

```
DSC>BAD=n[,m]
```

n
The logical block number (LBN) of the initial bad block in the group

m
The number of consecutive blocks contained in the group. If you omit this number, a value of 1 is assumed.

NOTE

A value is interpreted as an octal value unless a decimal point is placed immediately following the rightmost digit.

After you enter the first group of bad blocks, DSC reissues the BAD= prompt. At this point you can enter additional bad blocks by repeating the above procedure.

To terminate manual bad block entry, enter a carriage return immediately following the equal sign (=).

When all the bad blocks are entered, and the manual entry process is terminated, DSC begins the data transfer.

For example:

```
DSC>DBA1:/BAD=MAN:NOAUTO=MTA1:,MTA2:SYSFILE/RW

DSC>BAD=702.,7.
DSC>BAD=644.,2.
DSC>BAD=4057.
DSC>BAD=
DSC>
```

DSC restores the output disk, DBA1, from the tape file SYSFILE contained on MTA1 and MTA2, using as bad block descriptors only the blocks entered above. As a result, the following blocks have no data allocated to them:

```
702.   707.
703.   710.
704.   644.
705.   645.
706.   4057.
```

Compare the above example with the following example, which transfers data to the lowest LBNs on device DBA1, regardless of the contents of the resident bad block file:

```
DSC>DBA1:/BAD=NOAUTO=DB0:
```

NOTE

The bad block descriptor contained on a disk used with any of the /BAD= options is not overlaid or destroyed; it is either supplemented (/BAD=MAN) or ignored (/BAD=NOAUTO,/BAD=MAN:NOAUTO). The resident bad block descriptor, if ignored during a DSC operation, can be accessed when another DSC operation is performed on the disk.

If DSC must be provided manually with manufacturer-furnished or diagnostic bad block information, this information must identify bad blocks by LBNs.

The manufacturer-furnished or diagnostic bad block information usually identifies bad blocks by physical address (sector-track-cylinder). When this information is entered manually for DSC, the physical addresses are converted to LBNs by using the following formula:

```
LBN=((cylinder number*tracks/cylinder)+track number)*sectors/track+sector number
```

For example, a bad sector on an RP06 (19 tracks per cylinder and 22 sectors per track) has the physical address:

```
Cylinder number = 536 (octal), 350.
Track number    =  16 (octal),  14.
Sector number   =  13 (octal),  11.
```

The LBN is calculated as follows:

```
LBN=((350.*19.)+14.)*22.+11.=146619.
```

Bad block information is obtained by running the Field Service stand-alone diagnostic program or by using the Bad Block Locator Utility (BAD).

The Field Service stand-alone diagnostic program reads every word in a block. Associated bad-block messages are printed at the console terminal. The use of this diagnostic is recommended for users who want more comprehensive testing of a storage device. The output is the physical address of each bad block; this address is in LBN format.

The BAD utility automatically supplies LBNs of bad blocks for DSC. For information on the BAD utility, see VAX/VMS Operator's Guide.

2.4 APPEND QUALIFIER

The Append qualifier directs DSC to begin writing a file to the first specified volume of a tape set that contains only entire DSC-created files. The format of this qualifier is:

```
/AP
```

If more than one DSC-created file exists on the first volume, and the last file extends to other volumes, DSC terminates the command and displays an appropriate error message. Enter /AP as part of the output specification. Specify the volume to which files are to be appended as the first volume of the output side of the command string, as follows:

```
outdev:[filelabel]/AP=indev:[filelabel][/qualifier]
```

In the output specification, /AP causes DSC to search the first specified tape output volume for the last logical EOF created by a previous DSC command. If the last DSC-created file does not end on that volume, DSC terminates the operation and issues the following error message:

```
OUTPUT TAPE device:  full
```

If the first specified tape output volume is found to contain a portion of a DSC file that begins on a previous volume, DSC terminates the operation and issues the following error message:

```
TAPE AAAn:  A CONTINUATION TAPE
```

If DSC locates on the tape the end of a file that begins on another tape volume, DSC terminates the operation and issues the following error message:

```
OUTPUT TAPE device:  NOT ONLY REEL IN SET
```

An example of the Append qualifier follows:

```
DSC>MTA1:,MT:SYSFILE/RW/AP=DBA1:
```

In this example, DSC appends the contents of DBA1 to a DSC-created tape already on the first output device specified, MTA1. Before this can happen, however, MTA1 is rewound and searched for the last EOF block on the tape. When it is determined that only whole DSC files existed on the tape volume on MTA1, DSC appends the new file, SYSFILE, to the file or files already on the tape. If necessary, SYSFILE can extend to additional volumes.

NOTE

Use /AP only with output tape devices. Specifying /AP in any other situation results in an error message and termination of the command.

2.5 NONMERGE MODE QUALIFIER

The Nonmerge Mode qualifier is entered as part of the output specification to override the default merge mode of accessing and transcribing data files. The format of this qualifier is:

/NMG

When the input device in a DSC command is a disk, you can select either the merge or nonmerge mode of transferring files from the disk. When the input device is a tape, specifying this qualifier is meaningless because the current copy to disk is executed in the mode specified when the tape was created.

If you select nonmerge mode, specify /NMG as part of the output description. In nonmerge mode, DSC accesses each header in the index file in file number order. Then DSC writes the header and the blocks mapped by its retrieval pointers in virtual block number order to the output device. DSC does not distinguish between primary and extension file headers. Thus, the linkage between the sections of a large file does not change because files are linked by file number, and file numbers remain the same before and after a nonmerge mode transfer. The retrieval pointers in the output headers are updated to reflect the logical blocks occupied on the new output disk. The retrieval pointers are collapsed; that is, because DSC writes to large numbers of contiguous blocks, the number of retrieval pointers required to map these blocks on the new disk is reduced, and fewer pointers are used.

DSC transfers data in merge mode by default; you need not specify a qualifier. Initially, DSC accesses the first primary file header and writes the blocks mapped by its retrieval pointers to the output device. DSC then follows the linkage in the file header and checks for extension file headers pointed to by the primary file header. If extension headers exist, DSC accesses and transcribes them and the blocks they map until all extensions of the complete file are written to the output medium. Only when all extensions of a file have been transcribed does DSC access the next primary file header in the index file.

When file extensions are transcribed in merge mode, DSC updates the output retrieval pointers and file linkages involved in the transfer as required. This update not only involves collapsing retrieval pointers but may also reduce the number of file extensions that is required if enough retrieval pointers are eliminated.

As a result of a merge mode copy, each primary file header is immediately followed by all extensions associated with it. Because DSC writes data to contiguous blocks whenever possible, disks created by a merge mode operation have complete files written to contiguous blocks. Data blocks are grouped together in the lowest numbered blocks on the disk.

When disks are created in nonmerge mode, DSC writes data to the lowest numbered blocks on the disk. Files and their extensions are not concatenated; they are written in the original file number order.

An example of a nonmerge mode operation is:

```
DSC>MTA1:,MTA2:SYSFILE/RW/NMG=DBA1:
```

DSC writes the contents of the disk DBA1 in nonmerge mode to the beginning of the tapes in the output set MTA1 and MTA2. Although data compression occurs when DSC restores a disk from this tape set, file extensions do not necessarily occupy contiguous data blocks.

An example of a merge mode operation is:

```
DSC>DBA2:=DBA1:
```

DSC transcribes all the files on DBA1 to DBA2. DSC first concatenates files and associated file extensions and then writes the complete files contiguously to the lowest numbered blocks available on the disk.

2.6 DENSITY QUALIFIER

The Density qualifier overrides the default storage density on TE16 tape drives, changing the density from 800 bits per inch to 1600 bits per inch. The format of this qualifier is:

```
/DENS=1600
```

The TE16 tape unit automatically reads tapes at the density at which they were written, ignoring a density qualifier specified at read time. Mixed densities cannot be specified for multiple files being transferred to the same tape.

The Density qualifier directs the TE16 drive to operate as an output device at a density of 1600 bits per inch. Any DSC operation that writes tapes at 1600 bits per inch must start at BOT. Hence, if you specify both /AP and /DENS=1600 within the same command string, DSC ignores /DENS=1600.

The following example illustrates the use of the Density qualifier:

```
DSC>MTA1:,MTA2:SYSFILE/RW/DENS=1600=DBA1:
```

The tapes created in this example, MTA1 and MTA2, are written at 1600 bits per inch.

NOTE

If you specify the Density qualifier with a disk device, DSC halts the operation and issues an error message.

2.7 COMPARE QUALIFIER

The Compare qualifier directs DSC to compare the contents of two disks, a disk and a tape set, or a tape set and a disk. You can use the Compare qualifier with multivolume tapes, but not with multivolume disks. The format of this qualifier is:

```
/CMP
```

When DSC detects the end-of-volume (EOV) or EOF on other than the first reel of a set while comparing multivolume tapes, /CMP causes DSC to rewind and unload the current volume. The compare operation then resumes with the next volume of the set.

To compare contents, you can enter /CMP as part of the output specification; no copying is involved. For example:

```
outdev:[filelabel]/CMP=indev:[filelabel][/qualifier]
```

If you specify /CMP and the devices differ in content, DSC produces a warning listing the output device, file identification, and the virtual block number (VBN), and then continues the compare operation.

NOTE

An operation involving /CMP and magnetic tape input begins by positioning the first volume of the tape set to the specified or implied file, as described in Section 2.2. If the tape set consists of a single volume, that reel is positioned at the end of the current file when the compare operation ends. For multivolume sets, each reel of the set is rewound and unloaded as the operation on it is completed. The operation then resumes using the next volume of the set.

2.8 VERIFY QUALIFIER

The Verify qualifier directs DSC to perform a copy operation and then compare (verify) the contents of both devices. The verify pass occurs after the copy operation for each volume is complete. The format of this qualifier is:

```
/VE
```

To perform both copy and compare operations, enter /VE as part of the output device specification:

```
outdev:[filelabel]/VE=indev:[filelabel][/qualifier]
```

If you do not identify a file in a multivolume tape set, /VE causes DSC to begin copying the first tape of the set. When DSC detects the EOF, it repositions the input device (indev:) to the beginning of the file and begins the verify pass.

When DSC detects the EOV or EOF on other than the first reel of a set, /VE causes the tape to be rewound and searched for the beginning of the current file before verification.

When DSC detects the EOV or EOF on other than the first reel of a set during the verify pass, /VE causes DSC to rewind and unload the tape. The copy operation then resumes using the next reel.

NOTE

/VE first performs a copy operation. The media are then repositioned to enable the verify pass. If a tape is specified as one of the media, extra time is required after the copy operation to allow the tape to be rewound and searched for the current file.

CHAPTER 3

DSC OPERATION

As mentioned in Chapter 1, DSC'S data transfer process consists of either two or four data transfers. Transferring data from disk to tape and from tape to disk is a two-step operation involving four data transfers.

Step 1:

- Data is read from disk
- Data is written to tape

Step 2:

- Data is read from tape
- Data is written to disk

Transferring data from disk to disk is a direct, one-step operation involving only the first and fourth data transfers listed above.

The following sections describe how DSC effects each of the four data transfers.

3.1 DATA TRANSFER FROM DISK

After you enter the DSC command specifying a disk copy operation, DSC begins the data transfer by scanning the input disk to ensure that it is in Files-11 format. DSC begins transcribing data by copying part of the disk index file. Because this file is updated to reflect the status and location of blocks as they are allocated on the new disk, the index file bit map, the storage bit map file, and the bad block file are not transcribed exactly; DSC transcribes only the data necessary for constructing these files on the new disk.

If the transfer is in merge mode, DSC accesses the index file's index of active file headers in numerical order to locate the next active prime file header. DSC then transfers that header, the blocks it maps, and all extension headers and related blocks included as part of that file to the output medium before it accesses the next active prime file header from the index file. DSC continues this operation, each time writing a complete file, until it has transferred all the active files.

In nonmerge mode, DSC treats both prime file headers and extension file headers as if they map all the blocks in the file. DSC does not consolidate and transcribe the related file extensions as a unit, as in merge mode, but individually in index number order.

DSC accesses and transcribes only blocks allocated to active files. Unallocated blocks and blocks in the bad block file, all formerly interspersed throughout the input disk, are ignored. DSC transcribes only the contents of blocks allocated to active files. This results in contiguous data blocks on the output disk unless the output disk itself has bad blocks.

If, during the copy operation, DSC accesses a file that contains bad data written on a block that is not listed in the bad block file, DSC transcribes whatever it reads from the block. When DSC restores the file to disk, it writes the block's contents as it originally read them. The logical block still contains garbled data, but the new physical block can be accessed and its contents corrected. An error message identifying these areas is displayed on the console.

In summary, DSC performs the following three actions when reading data from a disk:

1. Verifies that the disk is online, correctly identified, and in Files-11 Structure Level 1 or Structure Level 2 format

2. Transcribes disk index files

3. Reads the data

NOTE

You can specify only one disk as the input device in any one DSC operation.

3.2 DATA TRANSFER TO TAPE

When you specify a magnetic tape drive as the output device in a DSC operation, DSC writes the data contents of the input disk to the tape on the drive. This data transfer usually involves more than one reel of tape, and may use more than one tape drive.

Tapes created by DSC serve as a back-up of the disk contents, but cannot be used by themselves. You can only use DSC tapes by copying them back to a disk, which restores the disk. Although the tapes contain many individual data files that are copied from the input disk, DSC treats the tapes as though they contain a single file -- the file of the disk's contents.

In copying the disk's contents to tape, DSC may transfer data to more than one tape. The first data block DSC writes to tape is a header containing the volume name (obtained from the file label) and the relative volume number. This header identifies the tape volume set and the volume's place within that set, ensuring that when DSC restores the disk, it loads the set of tapes in order.

Subsequent contents of the tapes include the data required to reconstruct disk directory files, maps and pointers, and the actual data files copied from the disk.

To initiate the tape creation process, you should ensure that the tape devices are online and correctly identified. You can specify multiple online tape drives in the following format:

```
DSC>AAAn:,AAAn:,AAAn:,AAAn:filelabel=AAAn:
```

For example:

```
DSC>MTA0:,MTB1:,MTA4:,MTB2:SYSFILE=DBA1:
```

You have the option of entering a file label after specifying the last device. You can specify up to eight drives per command; however, you can specify an individual tape drive only once.[1]

If the number of tape volumes required exceeds the number of tape drives available, DSC lets you replace tapes on the specified drives in round-robin fashion. Using the above example, the replacement sequence would be:

```
MTA0    MTB1    MTA4    MTB2    MTA0    MTB1    MTA4    MTB2 ...
```

This sequence would be followed until the data transfer is complete.

In summary, DSC performs the following four actions when writing data to magnetic tape:

1. Verifies that the first or only volume of a set is online and write enabled
2. Verifies that subsequent volumes of a tape set are at BOT, online when required, and correctly identified
3. Writes the data
4. Accesses tapes in round-robin order

NOTE

The input device must be a disk. Valid tape qualifiers are:

```
/RW     /NMG
/AP     /VE
/CMP
```

In addition, you can specify a file label for a tape. See Chapter 2 for more information on qualifiers and file labels.

3.3 DATA TRANSFER FROM TAPE

DSC can only use the tapes it creates to 1) reconstruct a disk or 2) perform compare and verify operations. When you mount the tapes and specify the tape drives as the input devices, DSC sequentially accesses and writes the tape contents to the output disk. As it transfers the data, DSC creates and updates the directory files.

Tape drives specified as input devices must be online and correctly identified. The tape volumes must be specified so as to be accessed in the correct order.

---

[1] See Section 1.5 for stand-alone DSC-supported devices.

In summary, DSC performs the following four actions when reading data from magnetic tape:

1. Verifies that the tape drives are online and correctly identified
2. Accesses tape volumes in round-robin order
3. Creates directory files
4. Reads the data

NOTE

If you specify a file label, DSC transfers only the contents of the file identified by that file label.

If you do not specify a file label, DSC transfers only the first file that it encounters on the first volume of a set.

The only valid qualifier is /RW.

3.4 DATA TRANSFER TO DISK

DSC's operation is not really complete until the data involved in the transfer is restored to disk.

To receive input, a disk must be online and correctly identified. You can specify any disk as the output device in any single operation as long as the disk is large enough to contain all the data involved in the transfer.

The disk should have an up-to-date bad block file, or have bad block data entered by the options to the Bad Block qualifier to ensure that the data being written on the disk is accessible. You should update the bad block descriptor immediately before the operation by running the BAD utility to eliminate the possibility of writing data to inaccessible blocks. If desired, you can supplement or override the bad block file by using the options to the Bad Block qualifier to enter bad blocks manually.

After identifying the bad blocks on the output disk, DSC examines the disk to ensure that it can contain all the data being transferred. DSC compares the number of blocks being transferred from the input device(s) with the number of blocks available on the output disk. DSC issues an appropriate error message if not enough blocks are available.

DSC begins constructing the index and storage bit map files when it begins transcribing files. DSC updates the file headers to reflect the location of the files on the new disk. This updating is required because blocks that were previously scattered are now copied to a contiguous set of blocks, beginning at the lowest Logical Block Numbers (LBNs) available on the disk. If the original disk was copied in merge mode, DSC writes 1) the prime file header and its contents and 2) associated file extension headers and the extensions they map as a unit to a contiguous series of blocks. If you specified the Nonmerge Mode qualifier in the original disk copy operation, DSC accesses each individual file header in index file order and transfers

the contents of the blocks it maps to the lowest LBNs available on the output disk. The output disk contains an index file of the same size as the original disk. This is especially important to note when the contents of a large disk (such as an RP06) are restored to a smaller disk (such as an RK06 or RK07).

Compressing files in this manner is beneficial when a file header's retrieval pointers are almost used up. Because DSC rearranges a disk so that large numbers of contiguous blocks are allocated to a single data file, the number of retrieval pointers required to map the location and length of the file contents can be significantly reduced. If the original data transfer is made in merge mode, the number of file extensions and extension headers can also be reduced.

When DSC concludes the data transfer, the allocated blocks occupy the lowest contiguous LBNs available on the disk. Blocks that are available for use generally have higher LBNs and are also contiguous.

Note that when DSC writes to a disk, it begins transcribing data into the lowest available LBN. Any existing data on the disk in this area is overlaid by the new data. Therefore, you cannot use DSC to transfer several smaller disks' contents onto a single, larger disk. Each copy operation wipes out whatever data previously occupied the blocks.

In summary, DSC performs the following five actions when writing data to a disk:

1. Verifies that the disk has an up-to-date bad block descriptor. A warning message is displayed if no bad block information is available and /BAD=NOAUTO was not specified.

2. Verifies that the disk is online and correctly identified.

3. Verifies that the disk has enough blocks available to contain all the data involved in the transfer.

4. Creates index and directory files.

5. Writes the data.

NOTE

DSC overlays any data originally contained on the specified output disk.

Use the Nonmerge Mode qualifier with an output disk only when the input device is also a disk.

Use the options to the Bad Block qualifier to override or supplement bad block data on the output disk.

CHAPTER 4

DSC MESSAGES

DSC notifies you not only of error conditions, but of conditions that could cause difficulties in DSC operations. Each message displayed by DSC has the prefix DSC--, and each message is identified by its numeric code.

The DSC-- prefix is usually followed by the word *WARNING* or *FATAL* to let you know what type of condition has occurred. When DSC displays a warning message, it continues executing the current operation. When DSC displays a fatal message, it terminates the current operation, and issues a prompt for a new command line. DSC also issues messages that are neither warning nor fatal messages; they are instructions that you must follow so that DSC can continue the current operation.

DSC messages are displayed at the console in either a long form or a short form. VAX-11 DSC displays the long form, while stand-alone DSC displays the short form.

An example of a VAX-11 DSC message is as follows:

```
DSC--*FATAL* 1 UNDEFINED ERROR
```

The same message as displayed by Stand-Alone DSC appears as:

```
DSC--*FATAL* 1
```

Section 4.1 lists all DSC messages according to their numeric code. DSC errors that are identified as I/O errors are accompanied by one or more of the messages listed in Section 4.2. Table 4-1 is a quick reference to the meanings of the single letter codes used in some of the error messages, referred to as general error messages, and the I/O error messages.

Table 4-1
General Error and I/O Error Message Codes

Type of Code	Symbol	Meaning
General Error Message	Code A	Failed to read storage map header
	Code B	Input data out of phase
	Code C	Nondata block encountered
	Code D	Input file out of phase
	Code E	File attributes out of phase
	Code F	File header out of phase
I/O Error Message	A	Reading index file bit map
	B	Reading index file header
	C	Reading storage bit map
	D	Reading boot or home block
	E	Reading file header
	F	Input (or output device)
	G	Writing index file bit map
	H	Writing storage bit map header
	I	Reading input device
	J	In input tape labels
	K	Reading file attributes
	L	Reading file header
	M	Reading index file data
	N	Reading summary data
	O	Writing file header

4.1 DSC MESSAGES: TEXT, EXPLANATION, AND CORRECTIVE ACTION

1 UNDEFINED ERROR

An unidentifiable internal error was encountered.

First, retry the operation. If the error recurs, submit a Software Performance Report (SPR).

2 CONFLICTING DEV. TYPES

An illegal combination of device types was specified.

Check for typographical errors in device abbreviations; make sure that disks and tape drives are not specified on the same side of the command string.

3 MIXED TAPE TYPES

Two different types of tape drive were specified in the command string.

Reenter the command specifying only the magnetic tape drive.

4 ILLEGAL SWITCH

The command string was entered with a qualifier that cannot be used.

Reenter the command with all qualifiers correctly specified.

5 **FILE LABEL TOO LONG**

A file label consisting of more than 12 characters was specified.

Correct the file label, and retry the operation.

6 **SYNTAX ERROR**

An error in the command string format occurred.

Check the command, and reenter the command in the correct order.

7 **DUP. DEV. NAME**

The same device was specified more than once in the command string.

Reenter the command, specifying each device only once.

8 **TOO MANY DEV'S**

More than eight devices were specified on one side of the command string.

Reenter the command, specifying no more than eight devices per side.

9 **DEV. device: NOT IN SYSTEM**

The specified device is not present in the configuration of the operating system being used.

Check the device identifier that was entered in the command string, and reenter the command.

10 **DEV. device: NOT FILES-11**

The specified input device is not formatted as a Files-11 device.

Check the input device to ensure it is the one desired, and reenter the command.

11 **BAD BLOCK SYNTAX ERROR**

A syntax error occurred when bad block data was entered manually.

Check the command that was entered, and reenter it correctly.

12 **BAD BLOCK COUNT TOO LARGE**

Too many bad blocks were manually entered in a single group.

Check the blocks being entered. If possible, enter several small groups instead of one large group.

13 **BAD BLOCK CLUSTER OUT OF RANGE**

A manually entered bad block or group of bad blocks did not exist on the output disk.

Check the numbers of the blocks entered, and reenter them correctly.

14 **OUTPUT TAPE ON device: NOT AT BOT**

The specified continuation tape was not at load point.

Remount or reset the tape at load point, and reenter the command.

15 **OUTPUT TAPE device: FULL**

The specified tape is full; data cannot be appended to it.

Reenter the command, and change the output tape.

16 **OUTPUT TAPE device: NOT ONLY REEL IN SET**

An illegal append operation was attempted.

Reenter the command, and either omit the Append qualifier to write to the specified tape or change tapes.

17 **TAPE AAAn: NOT ANSI FORMAT**

If AAAn is an output tape, an illegal append operation was specified.

Reenter the command, and either omit the Append qualifier to write to the specified tape or change tapes.

If AAAn is an input tape, the tape is not in the correct format for a DSC operation. Check the tape and change it if necessary.

18 **OUTPUT TAPE device: IS NOT A DSC TAPE**

An illegal append operation was attempted to a tape that was not created by DSC.

Reenter the command, and either omit the Append qualifier or change tapes.

19 **TAPE AAAn: A CONTINUATION TAPE**

If AAAn is an output tape, an illegal append operation was attempted. You can use the Append qualifier only on the first volume of a tape set.

Reenter the command, and change the output tape.

If AAAn is an input tape, the tape was mounted out of sequence.

Reenter the command, and specify the input tapes in the correct order.

20 **UNUSED**

21 **FAILED TO FIND HOME BLOCK device:**

A read error occurred during an attempt to copy from the input disk. Either the disk is bad, the home block is bad, or the disk is not in Files-11 format.

Check the disk in question, change disk drives if possible, and reenter the command.

22 **FILE STRUCTURE LEVEL ON device: NOT SUPPORTED**

The specified DSC utility program and the structure level of the specified volume did not agree.

Replace the device, and retry the operation.

23 **I/O ERROR A ON device:**

One or more messages will accompany this message, explaining why the specified file could not be read.

Retry the operation.

24 **I/O ERROR B ON device:**

One or more messages will accompany this message, indicating that an I/O error occurred and explaining why the file header on the device could not be read. The specified file was lost.

Retry the operation after correcting the cause of the error on the device.

25 **CODE A**

The file header for the storage bit map file could not be read.

The disk is unusable and therefore cannot be copied.

26 **I/O ERROR C ON device:**

One or more messages will accompany this message, explaining that an I/O error occurred during an attempt to read the specified file.

Retry the operation.

27 **I/O ERROR D ON device:**

A diagnostic message will accompany this message, indicating that a read error occurred during an attempt to read the name or boot block of the disk.

Retry the operation on a new drive.

28 **RELATIVE VOLUME X OF SET NOT MOUNTED**

The specified tape is not on the system.

Mount the tape, and reenter the command.

29 **UNUSED**

30 **UNUSED**

31 **I/O ERROR E ON device: file id**

One or more messages will accompany this message, explaining that an I/O error occurred during an attempt to read the specified file header.

Retry the operation.

32 INPUT DEVICE device: file id file number NOT PRESENT

The specified file did not have a file header in the index file; the file was not copied.

This is a warning only. If desired, the operation can be retried on a different disk drive.

33 INPUT DEVICE device: file id file number IS DELETED

The specified file was found to be partially deleted on the input disk and was not copied.

This is a warning only. No action is required.

34 INPUT DEVICE device: file id UNSUPPORTED STRUCTURE LEVEL

The file's structure level recorded in the file header did not match the volume's structure level. This inconsistency is probably due to a garbled file header.

The specified file was lost.

35 INPUT DEVICE device: file id, file number, FILE NUMBER CHECK

An incorrect file header was read from disk causing the specified file to be lost.

Retry the operation.

36 INPUT DEVICE device: file id, file number FILE HEADER CHECKSUM ERROR

Incorrect file header contents caused the specified file to be lost.

Retry the operation.

37 INPUT DEVICE device: file id, SEQUENCE NUMBER CHECK

The sequence number was incorrect.

Retry the operation, and/or replace the disk.

38 INPUT DEVICE device, file id, file number SEGMENT NUMBER CHECK

The linkage connecting file segments was broken; the specified file was lost.

Retry the operation.

39 DIRECTIVE ERROR

An internal error occurred, usually the result of a system overload.

Retry the operation.

40 **I/O ERROR F ON device:**

One or more messages will accompany this message, indicating that the specified input or output device may subsequently cause an error.

This message is a warning only. No action is required unless another error message is displayed. If another error message is displayed, correct the cause of the error and reenter the command.

41 **I/O ERROR I ON device: file id, file number, virtual block number**

One or more messages will accompany this message, indicating that an I/O error occurred which resulted in bad data being read from the specified virtual block number on the indicated device.

This is a warning message only. The block specified should be examined to determine the extent of the error.

42 **VERIFICATION ERROR ON device: file id, virtual block number**

This is a warning signifying that the input and output devices did not match.

43 **BAD DATA BLOCK ON device: file id, file number, virtual block number**

A parity error occurred during an attempt to copy the block's contents from disk. The block specified on the output disk contains erroneous data.

When the copy operation is completed, the data contained in the specified block should be examined and corrected.

44 **MOUNT REEL x ON device: AND HIT RETURN**

This is an instruction only.

Mount the volume number requested on the specified tape drive, and enter a carriage return when ready.

45 **STARTING VERIFY PASS**

This is simply a message informing you that the copy operation is complete and DSC is initiating the verify pass (/VE was specified).

46 **RESUME COPYING**

This is simply a message informing you that the verify pass is complete (/VE was specified) and DSC is continuing the copy operation.

47 **device: IS WRITE LOCKED. INSERT WRITE RING AND HIT RETURN**

The tape on the specified tape drive cannot be written on until a write enable ring is inserted.

Make sure the tape is the one you want, insert the write ring, and enter a carriage return.

48 **INPUT FILE ON device: WILL BE RESYNCHRONIZED**

The tape position was lost during an attempt to read the input tape. The file specified in the message, as well as some subsequent files, may be lost. Additional errors will probably occur.

Retry the operation from the beginning.

49 **OUTPUT DEVICE device: FULL**

The specified device is full and cannot accommodate the data following the specified file. This may mean that more data than anticipated was transferred due to an inconsistency in the input tapes.

Reenter the command, using a larger output disk.

50 **OUTPUT FILE HEADER FULL ON device:**

Too many blocks on the output disk have caused inconsistencies in file header data. The specified file was lost.

Retry the operation with a different output disk.

51 **OUTPUT FILE HEADER ON device: NOT MAPPED -- file id, file number**

Space for the specified file header was not allocated. The file was lost.

Retry the operation; a new disk may be required.

52 **I/O ERROR G ON device:**

One or more messages will accompany this message, indicating that an I/O error occurred during an attempt to write the specified file.

Retry the operation.

53 **FAILED TO READ FILE EXTENSION HEADER ON device: file id, file number**

During an attempt to copy data from the input disk, an extension header was searched for, but not found. The remainder of the specified file was lost. A problem may exist with the input disk, or a previous I/O error may have caused an inconsistency.

Retry the operation.

54 **FAILED TO ALLOCATE HOME BLOCK device:**

The home block could not be created on the specified disk device because it has too many bad blocks.

Replace the device, and reenter the command.

55 **INDEX FILE ALLOCATION FAILURE device:**

Too many bad blocks exist to allow the allocation for the specified file.

Replace the disk, and reenter the command.

56 **OUTPUT DISK device: IS NOT BOOTABLE**

Logical block number 0 of the specified disk or tape is bad.

This is a warning only. No action is required.

57 **INVALID BAD BLOCK DATA device:**

The bad block data on the output disk is invalid.

Run the BAD utility on the disk, manually enter bad block data, or reenter the command using a new disk.

58 **BAD BLOCK FILE FULL device:**

Too many bad blocks exist on the output disk.

Replace the disk, and reenter the command.

59 **NO BAD BLOCK DATA FOUND device:**

No bad block data exists for the specified output disk.

If bad block data is not desired, ignore the message. Otherwise, run the BAD program on the disk, manually enter bad block data, or reenter the command using a new disk.

60 **OUTPUT DEVICE device: IS A DIAGNOSTIC PACK. DO NOT USE IT!**

The specified output disk is a diagnostic pack and cannot be used.

Mount a new output disk, and reenter the command.

61 **CODE B ON device: file id, file number, VBN; expected x, found y**

The tape position was lost during an attempt to read the virtual block number specified. Some data may be lost.

Determine the extent of the error. If necessary, try the tape on another drive or create another tape.

62 **CODE C ON device: file id, file number, VBN**

The position of the tape was lost during an attempt to read the data file specified. Data beyond the virtual block number specified was lost.

Recreate the tape or retry the operation on a different tape drive.

63 **CODE D ON device: file id, file number, expected x, found y**

The tape position was lost during an attempt to read the specified tape. All of "y" and some of "x" were lost.

Retry the entire operation.

64 **FAILED TO MAP OUTPUT FILE ON device: file id, file number**

An inconsistency occurred during an attempt to write the specified file to the output disk. The file header did not specify the correct number of virtual blocks required to write the file and the file was lost.

Retry the operation.

65 **OUTPUT DISK device: IS TOO SMALL -- nn BLOCKS NEEDED**

The output disk is not large enough to accommodate the data to be transferred.

Retry the operation specifying a larger output disk.

66 **I/O ERROR C ON device:**

One or more messages will accompany this message, explaining that an I/O error occurred during an attempt to read the specified file.

Retry the operation.

67 **I/O ERROR H ON device:**

One or more messages will accompany this message, explaining that an I/O error occurred during an attempt to write the specified file.

Retry the operation.

68 **I/O ERROR J ON device:**

One or more messages will accompany this message, explaining that an I/O error occurred during an attempt to read the tape labels on the specified device.

Retry the operation on a different tape drive.

69 **INPUT TAPE ON device: MUST BE AT BOT**

The specified tape must be at the beginning of the tape (BOT) or at its load point. This message is also displayed during a verify operation to indicate that the current volume is rewinding to enable the verify pass.

If /VE was not specified, check the tape and remount at load point.

70 **WRONG INPUT TAPE ON device: EXPECTING file id FOUND file id**

The input tapes were specified out of sequence.

Check the tapes and reenter them in the correct order after receiving mount instructions.

71 **CODE E ON device: AFTER file id, file number**

This is the result of a read error from tape. During an attempt to read an attribute block, some other block was accessed. The file following the file specified in the error message was lost.

Retry the operation.

72 **I/O ERROR K ON device:**

One or more messages will accompany this message, indicating that an I/O error occurred during an attempt to read the specified file.

Retry the operation.

73 **I/O ERROR L ON device:**

One or more messages will accompany this message, indicating that an I/O error occurred during an attempt to read the file header.

Retry the operation.

74 **INPUT TAPE device: RESYNCHRONIZED AT file id, file number**

The tape position was recovered. Some data preceding the file specified was lost.

This message is usually displayed with one or more error messages, all indicating that the input tape was either read incorrectly or recorded badly. The tape should be recreated and the operation reinitiated.

75 **TAPE FILE filelabel NOT FOUND ON device:**

The input tape specified does not contain the file identified as "filelabel."

Check the file label and the tape, and reenter the command when the correct tape and file label are specified.

76 **EXPECTED EXTENSION HEADER NOT PRESENT ON device: file id, file number**

A tape read error occurred, causing the specified file to be lost.

If the error message was preceded by one or more I/O warning messages, the operation should be retried. If not, the input tape is bad and should be regenerated.

77 **CODE F ON device: AFTER file id, file number**

This is the result of a read error from tape. During an attempt to read a file header, some other block type was accessed. The file following the file specified in the error message was lost.

Retry the operation.

78 **I/O ERROR M ON device:**

One or more messages will accompany this message, explaining why the specified file could not be read.

Retry the operation.

79 **INDEX FILE DATA NOT PRESENT device:**

During an attempt to read the input tape specified, a file other than the index file was accessed due to a tape error or an I/O error.

Recreate the tape or retry the same tape on a different tape drive.

80 **I/O ERROR N ON device:**

One or more messages will accompany this message, indicating that an I/O error occurred during an attempt to restore the index and storage map files from the specified input tape.

Retry the operation using a different input tape drive.

81 **VOLUME SUMMARY DATA NOT PRESENT device:**

Either the input tape is not a DSC tape or it contains incomplete data.

Check the tape, and reenter the command.

82 **I/O ERROR O device: file id, file number**

One or more messages will accompany this message, indicating that an I/O error occurred during an attempt to write the specified file header.

Retry the operation.

4.2 DSC I/O ERROR MESSAGES

DSC errors identified as I/O errors are accompanied by one or more of the following error messages to explain the type of I/O error that occurred.

BAD BLOCK NUMBER

The block does not exist on the disk, an internal DSC error occurred, or the block is bad.

Retry the operation with a new disk and/or disk drive.

BAD BLOCK ON DEVICE

A device malfunction occurred or a tape with bad data on it was used, resulting in a block containing incorrect information.

Retry the operation.

BLOCK CHECK

A parity error occurred indicating that bad data may have been transferred.

Retry the operation.

DATA OVERRUN

The physical tape used was larger than expected or got out of position, or was in the wrong format.

Make sure the tape is the right one and retry the operation.

DEVICE NOT READY

The device was not ready or not up to speed, or a blank tape was used as an input tape.

Retry the operation after checking that the device is online and correctly mounted.

DEVICE OFFLINE

The device is not in the system.

Check both the device and the device specification in the command string, and reenter the command.

DEVICE WRITE LOCKED

The disk drive is write locked.

Write enable the disk drive, and reenter the command.

END OF FILE DETECTED

The tape position was lost.

Retry the operation.

END OF TAPE DETECTED

The tape position was lost.

Retry the operation.

END OF VOLUME DETECTED

The tape position was lost.

Retry the operation.

FATAL HARDWARE ERROR

A hardware malfunction occurred.

Retry the operation; if the error recurs call DIGITAL Field Service.

INSUFFICIENT POOL SPACE

The operating system is overloaded.

Retry the operation.

PARITY ERROR ON DEVICE

A device malfunction or media incompatibility occurred.

Retry the operation.

PRIVILEGE VIOLATION

A device has been mounted as Files-11.

Dismount the disk, mount it as a foreign volume, and retry the operation.

UNKNOWN SYSTEM ERROR

An undefinable I/O error occurred.

Retry the operation.

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V

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NOTE: This form is for document comments only. DIGITAL will use comments submitted on this form at the company's discretion. If you require a written reply and are eligible to receive one under Software Performance Report (SPR) service, submit your comments on an SPR form.

Did you find this manual understandable, usable, and well-organized? Please make suggestions for improvement.

Did you find errors in this manual? If so, specify the error and the page number.

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