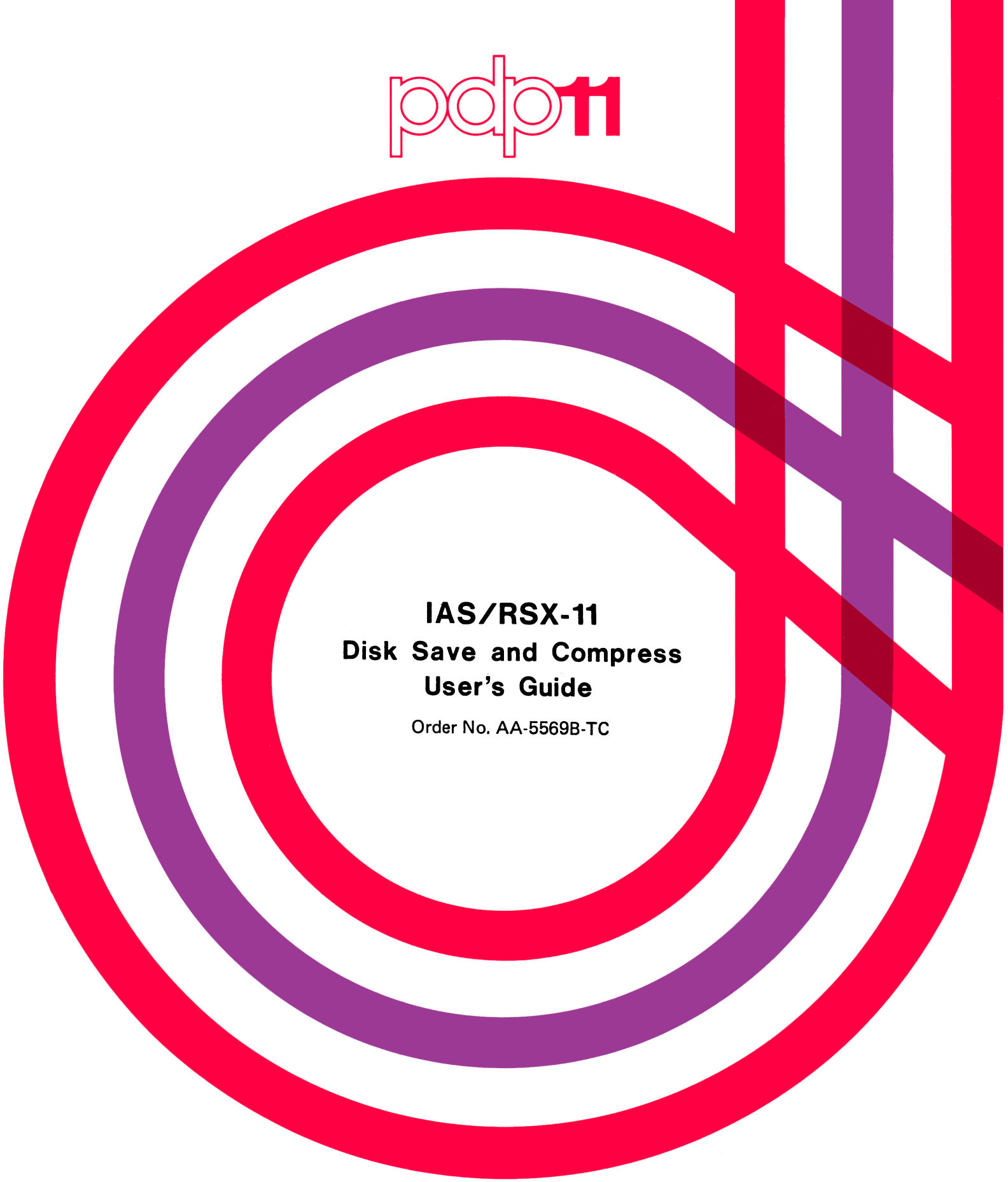

IAS/RSX-11
Disk Save and Compress User's Guide

Order No. AA-5569B-TC

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ABSTRACT

This manual describes the IAS/RSX-11 Disk Save and Compress (DSC) utility program capabilities and usage. The manual is organized into four major sections. Section 1 describes DSC's general purpose, operation, and the command string format. Section 2 describes the available options and their uses. Section 3 describes the details of DSC's operations. Section 4 is a list of error messages, their meanings, and suggested recovery procedures.

This manual is for persons with some experience with PDP-11 systems. It is not a primer. Those using it should be familiar with bootstrap and mounting procedures. Some of the options offered by DSC require a knowledge of the concepts of FILES-11 on-disk structure. If you are not familiar with these procedures and concepts consult the documents associated with your system.

This is a revised manual, which describes DSC functionality that is currently available only on RSX-11M V3.1 DSC users with the following system should continue to refer to the *IAS/RSX-11 Disk Save and Compress User's Guide,* Order No. DEC-11-OIRUA-A-D:

RSX-11D V6.2
IAS V2.0
RSX-11M V3.0

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ASSIST-11	RTS-8	ITPS-10

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1.0 OVERVIEW AND INTRODUCTION TO DSC

The Disk Save and Compress (DSC) utility program copies the files contained on FILES-11 disks to tape or disk for backup and storage, and reallocates and consolidates the disk area used for data storage. DSC also concatenates files and extensions into contiguous data blocks and reduces the required number of retrieval pointers and file headers.

NOTE

The status of the devices that DSC uses during its operation varies with the operating system you use. If you are using DSC under the RSX-11M operating system, all devices used in the operation, both disk drives and tape drives, must be unmounted. If you are using an RSX-11D or IAS system, all devices except the system disk must be mounted with foreign characteristics. If the IAS or RSX-11D system disk is being used with DSC, it must be mounted with DCF characteristics.

DSC transfers data from a FILES-11 formatted disk to either disk or tape by copying only those blocks allocated to active files. Data files randomly scattered over the disk are accessed 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 as well as improving access efficiency.

DSC can write contents of a disk to another disk or can transcribe them to magnetic tape for permanent storage. 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 with the exception that the additional storage space is available for use.

You can also use DSC to recover from a hardware malfunction that renders a portion of the disk unreadable. If the contents of a block allocated to a data file cannot be read without causing a read error, DSC 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.

NOTE

Bootable system disks should not be copied using DSC on IAS versions less than 2.0, RSX-11D versions less than 6.2, or RSX-11M versions less than 3.0, since the disk created by these versions is no longer bootable.

Disks created on IAS version 2.0, RSX-11D version 6.2, and RSX-11M versions 3.0 and 3.1, retain bootable characteristics.

The copied disk must be used on the original controller, since the bootstrap blocks are only contained on the original controller.

1.1 Initiating and Terminating DSC

The DSC utility program is included as part of the software release package for RSX-11M, RSX-11D, and IAS operating systems. To initiate DSC, enter the appropriate command following the system prompt:

RSX:

For RSX-11M the MCR prompt is:

```
>
```

For RSX-11D the MCR prompt is:

```
MCR>
```

Use the following command line to invoke DSC to execute a function and then return control directly to the MCR:

```
MCR>DSC command string
```

This method allows you to enter a single command for execution. DSC is loaded, the command is executed, and control returns to the MCR.

To invoke DSC and pass control to it, enter:

```
MCR>DSC
```

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

```
DSC>
```

indicating that DSC is ready to accept another DSC command.

IAS:

```
PDS>RUN [11,1]DSC
```

which will cause the prompt:

```
DSC>
```

to be returned when DSC is ready.

To return control to the operating system after all DSC commands have been completed, type CTRL/Z.

You may also bootstrap the stand-alone version of DSC from disk or from tapes supplied with the operating system software package. Under RSX-11M you can bring the stand-alone version into memory in either of two ways:

1. Enter the privileged BOO[T] command as shown:

   ```
   BOO[1,54]DSCSYS
   ```

   which accesses the DSCSYS.SYS file from disk and brings in the stand-alone version of DSC.

2. Mount the medium containing the DSC image and use the console switches to load the appropriate bootstrap address.

Under RSX-11D and IAS, you can bring the stand-alone version into memory by bootstrapping the medium that contains a stand-alone DSC image.

When the stand-alone version is booted in, it displays the following message:

```
RSX-11S V2.1 BL22 DISK SAVE AND COMPRESS UTILITY
DSC>
```

and is ready to accept commands. You may terminate the stand-alone version by halting the processor.

1.2 DSC Command Format

DSC commands are entered in the format:

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

where:

outdev:	lists the physical device(s) to which data are transferred. The format of outdev: is AAnn: where AA are the ASCII characters that specify the device mnemonic, nn is the optional 1- or 2-digit (octal) unit number, and the colon is the device name terminator. If the device number is omitted, 0 is assumed. When more than one tape drive is listed, the device symbols must appear in succession, separated by commas, before any other command parameters are specified. See Section 3.2.
[filelabel]	(output) is the identifier of the tape file that is created in a disk to tape data transfer. If a filelabel is not specified when a tape file is created from disk, the disk volume label is used as the identifier. See Section 2.1.
[/switch]	is one or more of the optional switches described in Sections 2.2 through 2.9.4.
indev:	lists the physical device(s) in the format AAnn: from which data are copied (described in outdev: above). See Section 3.3.
[filelabel]	(input) is the identifier of the DSC-created tape file that is to be transferred to disk. If a filelabel is not provided when a disk is created from a tape, the first file on the tape is transferred. See Section 2.1.
[/switch]	is one or more of the optional switches described in Sections 2.2 through 2.9.4.

Consider the following example of a DSC command string:

```
DSC>MM01:,MM2:SYSFILE/DENS=1600=DB:
```

In this example, DSC writes the contents of the RP04 disk pack DB0: to two TU16 tape drives, MM01: and MM2:. The resultant tape volume set recorded at a density of 1600 bits/inch contains all the data files from DB0: in the tape file named "SYSFILE".

1.3 DSC-Supported Devices

Table 1 lists the devices that may be used with DSC:

Table 1
DSC-Supported Devices

Mnemonic	Type	Class
DM	RK611/RK06 cartridge disk	Block-structured
DB	RH11/RP04/RP05/RP06 and RH70/ RP04/RP05/RP06 disk pack	Block-structured
DK	RK11/RK05/RK05F cartridge disk	Block-structured
DF*	RF11/RS11 fixed head disk	Block-structured
DL	RL01/RL11 cartridge disk	Block-structured
DP	RP11/RP02/RP03 disk pack	Block-structured
DR	RH11/RH70/RM03 RM02 disk pack	Block-structured
DS*	RH11/RS03/RS04 and RH70/RS03 RS04 fixed head disk	Block-structured
DT*	TC11/TU56 DECtape	Block-structured
DX*	RX11/RK01 Floppy Disk	Block-structured
MM	RH11/TM02-03/TE16/TU16/TU45 and RH70/TM02-03/TE16/TU16/TU45 9-track magnetic tape	Tape
MT	TM11/TU10/TE10 7- or 9-track magnetic tape and TMA11/TS03 9-track magnetic tape	Tape

* Indicates that the device cannot be used with the stand-alone version of DSC.

1.4 Data Transfer

DSC's operation is a cycle that begins with data on a disk and ends with data on a disk in compressed form. The operation can take one step, a direct disk to disk transcription, or two steps, from disk to tape and from tape to disk. Each step consists of two data transfers. A 2-step operation encompasses the four transfers below:

Step 1.

1. Data are copied from disk.
2. Data are written to tape.

Step 2.

3. Data are copied from tape.
4. Data are written to disk.

A 1-step (disk to disk) operation consists of only the first and last data transfers.

DSC does not support data transfer from tape to tape.

2.0 DSC OPTIONS

One option and twelve optional switches may be used with DSC commands. The formats and usages of these options are discussed in the sections which follow. Table 2 lists the switches and their functions:

Table 2
DSC Option Switch Descriptions

Switch	Format	Description
Rewind switch	/RW	Rewinds magnetic tapes before execution of the current command. (Section 2.2.)
Bad block switch	/BAD= {MAN | NOAUTO | MAN:NOAUTO}	Allows manual entry of bad block locations. Can supplement or ignore the bad block file. (Section 2.3.)
Append switch	/AP	Appends a DSC file to a magnetic tape that already contains a whole DSC file. (Section 2.4.)
Non-Merge mode switch	/NMG	Copies data from disk without consolidating all the extensions of a file. (Section 2.5.)
1600 bits/in. switch	/DENS=1600	Creates magnetic tapes at 1600 bits/in. density. (Section 2.6.1.)
Split density switch	/DENS=800:1600	Creates magnetic tapes with volume header information at 800 bits/in. and the rest of the tape at 1600 bits/in. (Section 2.6.2.)
Compare switch	/CMP	Compares indev: and outdev: for differences. (Section 2.7.)
Verify switch	/VE	Copies data from the indev: and performs compare operation following data transfer. (Section 2.8.)

(continued on next page)

Table 2 (Cont.)
DSC Option Switch Descriptions

Switch	Format	Description
The following switches can only be used with the stand-alone version of DSC:		
Control Status Register switch	/CSR=xxxxxx	Alters control status addresses for specific device-types. (Section 2.9.1.)
TM02 formatter switch	/TM02=x	Alters the physical unit number of the TM02/TM03 formatter. (Section 2.9.2.)
Unit switch	/UNIT=x	Specifies the physical unit that a logical unit number accesses. (Section 2.9.3.)
Vector address switch	/VEC=xxx	Alters the vector address of a unit. (Section 2.9.4.)

2.1 Filelabel

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

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

1. An option switch
2. An equal sign (indicating the end of the output side of the command)

   or

3. A carriage return (indicating the end of the command string)

Note in this example:

```
DSC>MM01:,MM02:SYSFILE=DB1:
```

that DSC uses the filelabel SYSFILE to identify the file on tape which will contain the data that will be copied from the specified input disk, DB1:.

The filelabel may optionally be used when restoring data to disk. If you enter the filelabel as part of the input specification, DSC

searches the first tape for a file with the same name as the specified filelabel. When the file is found, DSC transfers it to disk. If, however, you do not specify a filelabel, DSC transfers the first file it locates on the first tape. In both cases, using the /RW switch (described in Section 2.2) causes the tape to be rewound to its beginning before the search for the file starts.

Consider the following example:

```
DSC>DB1:=MM01:,MM02:SYSFILE
```

Since the /RW switch is not specified on the input side, DSC searches the first tape volume specified, MM01:, beginning at the current position of the tape for a DSC file named SYSFILE. If DSC finds the header for SYSFILE in the first volume, it makes the data transfer. If, however, the header is not found on the first volume, DSC issues an appropriate error message and terminates the operation. If the command were entered without the filelabel, DSC would search, from the current position of MM01:, for the beginning of a DSC file and transfer the first file of disk contents it locates on tape drive MM01: regardless of the filename. 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 Switch (/RW)

The /RW switch 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 the tape position when DSC calls for them.

If you enter the /RW switch as part of the input specification, DSC rewinds the first tape before the copy operation begins. If you specify a filelabel with the /RW switch, after the tape is rewound DSC searches for the specified file of disk contents from the beginning of the first tape volume. If you do not specify a filelabel, DSC transfers the first file encountered on the first volume. After a tape of a multi volume tape set has been copied, DSC rewinds it back to the beginning and places it off-line. 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.

When the /RW switch is used 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 were contained on the tape. If you do not enter the REWIND switch with the output specification, and the tape is not at load point, DSC begins writing to the tape following the last end-of-file block encountered as described in Section 2.4. If the tape is at load point when the command is entered, it is overwritten from its beginning whether or not the /RW switch is specified unless the /AP switch (Section 2.4) has been specified. If the current file being copied extends beyond the first volume, that volume and all subsequent volumes of the set will be 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 end-of-tape is sensed during the search for the last EOF block, the current command will be aborted and DSC will issue an appropriate error message.

NOTE

The REWIND switch can only be used in conjunction with magnetic tapes. If used with any other device, an error message occurs.

Note that in the following command:

```
DSC>MM01:SYSFILE/RW=DB1:
```

DSC rewinds the tape on drive MM01: to its beginning before it writes and overlays any data contained on the tape. The contents of DB1: are written to a single file identified as SYSFILE. DSC will 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 will be rewound and unloaded.

In this example:

```
DSC>DB1:=MM01:,MM02:SYSFILE/RW
```

DSC restores a disk (DB1:) using a tape created by a previous command. DSC rewinds the first tape volume (on MM01:) and searches for a previously created DSC file labeled SYSFILE. If the file is found, DSC transcribes it. If it is not found, DSC issues an error message and terminates the operation. Each volume of the tape set will be rewound and unloaded when the data it contains has been copied.

2.3 BAD BLOCK Switch (/BAD)

Use the /BAD switch in conjunction with output disks to control DSC's use of bad block information.

There are three variations of the /BAD switch which allow you to 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 /BAD switch in no way affects the bad block descriptor, which is left after you run the BAD and INITVOL commands, or the factory-recorded bad block information on RK06, RL01 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 may access the bad block file in subsequent DSC operations.

The formats for the /BAD switch and its options are:

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

where:

MAN	allows manual entry of bad block data, which are included in the bad block file present 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.

When you specify MAN or MAN:NOAUTO with the /BAD option, 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 may 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]
```

where:

n is the logical block number (LBN), in octal, of the initial bad block in the group

m is the number, in octal, of consecutive blocks contained in the group. If omitted, a value of 1 is assumed.

NOTE

If you wish to specify a decimal number for either m or n, you must place a decimal point after the number.

After the first group of bad blocks is entered, DSC reissues the BAD= prompt. At this point you may 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 have been entered, and the manual entry process is terminated, DSC begins the data transfer.

Consider the following example:

```
DSC>DB1:/BAD=MAN:NOAUTO=MM01:,MM02:SYSFILE/RW

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

DSC restores the output disk, DB1:, from the tape file SYSFILE contained on MM01: and MM02, using as bad block descriptors only those blocks entered above. In response to DSC's prompts for bad blocks following the /BAD=MAN:NOAUTO switch in the command string, the following blocks (which were entered in the example above) will not have 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 DB1:, regardless of the contents of the resident bad block file:

```
DSC>DB1:/BAD=NOAUTO=DB0:
```

NOTE

The bad block descriptor contained on a disk used with any of the /BAD= switches 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 Logical Block Numbers (LBNs).

The manufacturer-furnished or diagnostic bad block information usually identifies bad blocks by physical address (sector-track-cylinder). When entering this information manually for DSC, convert the physical addresses to Logical Block Numbers by using the following formula:

```
LBN=(((cyl no.*trk's/cyl)+trk no.)*sec's/trk)+sec no.
```

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

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

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

Bad block information is obtained by running the Field Service stand-alone diagnostic or by using the Bad Block Locator Utility (BAD), which is described in the RSX-11 Utilities Procedures Manual.

The BAD utility automatically supplies Logical Block Numbers of bad blocks for DSC.

The Field Service stand-alone diagnostic reads every word in a block. Associated bad-block messages are printed at the console terminal. The use of this diagnostic is recommended for the user who wants more comprehensive testing of a storage device. However, the output is the physical address of each bad block; this address must be converted to LBNs for DSC by using the above formula.

2.4 APPEND Switch (/AP)

The /AP switch directs DSC to begin writing a file to the first specified volume of a tape set that contains only entire DSC-created files. If more than one DSC-created file exists on the first volume, and the last file extends to other volumes, DSC will terminate the command and display an appropriate error message. Enter the /AP switch as part of the output specification. The volume to which files are to be appended must be specified as the first volume of the output side of the command string.

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

When you use the /AP switch with the output specification, DSC searches the first specified tape output volume for the last logical end-of-file (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 AAnn:  IS FULL
```

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

```
OUTPUT TAPE AAnn:  IS A CONTINUATION TAPE
```

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

```
OUTPUT TAPE AAnn:  IS NOT THE ONLY REEL IN ITS SET
```

Consider what would occur if the following command string were entered, accepted, and processed:

```
DSC>MM01:,MM:SYSFILE/RW/AP=DX1:
```

DSC would append the contents of DX1: to a DSC-created file already present on the first output device specified, MM01. Before this could happen, though, MM01 would have been rewound and searched for the last EOF block on the tape. When it was determined that only whole DSC files existed on the tape volume on MM01:, DSC would append the new file, SYSFILE, to the file or files already on the tape. If necessary, SYSFILE could extend to additional volumes.

NOTE

You may only use the /AP switch with output tape devices. Specification of /AP in any other situation results in an error message and termination of the command.

2.5 NON-MERGE Mode Switch (/NMG)

Enter the NON-MERGE mode switch as part of the output specification to override the default MERGE mode of accessing and transcribing data files. When the input device in a DSC command is a disk, you may select either the MERGE or NON-MERGE mode of transferring files from the disk. When the input device is a tape, specification of this switch is meaningless since the current copy to disk will be executed in the same mode that was specified when the tape was created.

If you select NON-MERGE mode, specify the /NMG switch as part of the output description. In NON-MERGE 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 NON-MERGE 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, since 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.

To transfer data in MERGE mode, do not specify a switch. 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 have been 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 not only involves collapsing retrieval pointers (reducing the number of pointers used) but it may also reduce the number of file extensions that is required if enough retrieval pointers are dispensed with.

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 NON-MERGE 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.

Note in this example, which uses the /NMG switch:

```
DSC>MM01:,MM02:SYSFILE/RW/NMG=DB1:
```

that DSC writes the contents of the disk DB1: in NON-MERGE mode to the beginning of the tapes in the output set MM01: and MM02:. Although data compression occurs when DSC restores a disk from this tape set, file extensions do not necessarily occupy contiguous data blocks.

In this example of a MERGE mode operation:

```
DSC>DB2:=DB1:
```

DSC transcribes all of the files on DB1: to DB2:. 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 Switches

DSC provides two option switches for TU16, TE16, and TU45 tape drives to override the default storage density of 800 bits/in. They are discussed in the following two sections. Although tape drives other than TU16s, TE16s, and TU45s may be used with DSC, only TU16, TE16, and TU45 drives may use the density switches. All tape drives operate at a default density of 800 bits/in.

The density switch specified when a tape is created need not be used when the tape is read. DSC experimentally determines the density of all input tapes by first trying to read the tape at 800 bits/in. and then, if necessary, at 1600 bits/in. DSC ignores density switches used in conjunction with input tapes.

2.6.1 1600 Bits/In. Switch (/DENS=1600) - The 1600 bits/in. switch directs the TU16, TE16, or the TU45 drive to operate as an output device at a density of 1600 bits/in. All volumes written by the device will be created at this density.

The following example illustrates the use of the 1600 bits/in. switch:

```
DSC>MM01:,MM02:SYSFILE/RW/AP/DENS=1600=DB1:
```

The tapes created in this example, MM01: and MM02: are written at 1600 bits/in.

2.6.2 Split Density Switch (/DENS=800:1600) - The Split Density switch directs the TU16 or TU45 drive to write the entire volume set, except for the first two blocks on each volume of the set, at 1600 bits/in. The first two blocks, which contain the volume header information, are written at a density of 800 bits/in.

Tapes created in Split Density violate ANSI standards.

Consider the following example:

```
DSC>MM01:,MM02:SYSFILE/RW/DENS=800:1600=DB1:
```

The tapes created in this example have the first two blocks of each volume recorded at 800 bits/in. and the remainder of each volume recorded at 1600 bits/in.

NOTE

You may only use the two density switches, DENS=1600 and DENS=800:1600, with TU16 and TU45 tape drives. The DENS=1600 switch may also be used with TE16 drives; the split density switch cannot be specified. If you specify a density switch with a disk device, DSC halts the operation and issues an error message. If you specify a density switch with tape drives other than TU16 or TU45, DSC ignores the switch and does not alter the 800 bits/in. recording density. If you specify both density switches in the same command, DSC uses the Split density switch and does not issue an error message.

2.7 Compare Switch (/CMP)

The Compare Switch directs DSC to compare the contents of two disks, a disk and a tapeset, or a tapeset and a disk. Multi-volume tapes are valid, but specification of the /CMP switch with multi-volume disks is not recognized.

When EOV or EOF is detected on other than the first reel of a set while comparing multi-volume tapes, the /CMP switch will cause DSC to rewind and unload the current volume. The compare operation then resumes with the next volume of the set.

The /CMP switch may only be entered as part of the output specification only to compare contents, no copying is involved.

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

If you specify the /CMP switch and the devices differ in content, DSC produces a warning listing the outdev:#, file ID, and the 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 will be positioned at the end of the current file when the compare function ends. When using 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 Switch (/VE)

The Verify Switch 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.

Enter the /VE switch only as part of the outdev: specification to perform both copy and compare operations.

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

If you do not identify a file in a multi-volume tape set, the /VE switch specification causes DSC to begin copying the first tape of the set. Detection of EOF repositions the indev: to the beginning of the file and enables the verify pass.

Detection of EOV or EOF on other than the first reel of a set causes the tape to be rewound and searched for the beginning of the current file before verification.

Detection of EOV or EOF on other than the first reel of a set during the verify pass causes DSC to rewind and unload the media. The copy operation then resumes using the next reel.

NOTE

/VE specification 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 following the copy operation to allow the tape to be rewound and searched for the current file.

2.9 Stand-Alone DSC Switches

You can bring the stand-alone version of DSC into memory by bootstrapping the system from a medium supplied with the system or by using the privileged RSX-11M BOO[T] command to bring the DSCSYS.SYS image into memory from the generated operating system.

The stand-alone version of DSC does not support all the features of the standard version. When the stand-alone version is selected:

- DECtapes, floppy disks, and DF/DS fixed-head disks cannot be used.
- Logical unit numbers of devices are limited to 0 and 1.
- No more than two input or output devices can be specified per command.
- One controller is supported for each device type.
- Non-standard vector addresses are generated for RM03, RP02, and RP03 disk packs, and TU10/TE10 and TS03 magnetic tape drives.

Table 3 displays the Control Status Register (CSR) and vector addresses of the device-types supported and generated by the stand-alone version of DSC.

Table 3
System-Generated CSR and Vector Addresses

Device type	CSR	Vector
DB	176700	254
DK	177404	220
DL	174400	330
DM	177440	210
DP	176714	300*
DR	176700	254*
MM	172440	224
MT	172522	320*

* Indicates non-standard vector address

You can amend the limitations of the stand-alone version of DSC to a degree by using the following four switches that are supplied only with the stand-alone version.

- The /CSR switch changes the Control Status Register for a specific device.
- The /VEC switch changes the vector address for all devices of the specified device type.
- The /UNIT switch changes the physical unit numbers assigned to a device from the generated logical unit values of 0 and 1.
- The /TM02 switch changes the physical unit number of the TM02 or TM03 formatter from the generated unit number of 0.

The four switches supplied with the stand-alone version can appear together in a single command line to alter the appropriate values of a single device or device type. However, when you specify stand-alone switches in a command line, you cannot use that command line to alter values for more than one device type, or to generate a data transfer operation. Thus, when you use these switches you must enter at least two command lines; one to specify the switches for a device or device type, and one to initiate the data transfer.

When you set these switches, DSC uses them in all commands until you either specify new switch values, or remove the booted stand-alone version of DSC.

The general format of a stand-alone switch specification is:

```
DSC>AAnn:/switch1=x.../switchm=y
```

where:

AAnn:	is the device identifier
switch1=x through switchm=y	are the specifications of stand-alone switches described below.

NOTE

Switches may only be specified for one device or device type in a single line. If both disks and tapes require stand-alone switches, enter at least two lines, one for each device type.

2.9.1 **Control Status Register Switch (/CSR)** - Use the /CSR switch to alter the CSR addresses of device types that are generated by the stand-alone version of DSC (listed in Table 3) so that they conform with the addresses of the system you are using. The following example shows the correct use of the /CSR switch:

```
DSC>MM1:/CSR=160546
DSC>DB0:/CSR=160646
DSC>command-string
```

In the above example, the system on which DSC is being used will have the CSR addresses of MM1: tape drive and DB0: disk drive set to 160546 and 160646 respectively. After you enter these values, you can then enter a command-string that will initiate a copy operation. Note that neither of the above commands causes a copy operation to begin.

NOTE

If a copy operation involves more than one device of the same type, the /CSR switch must be specified for each device of that type.

2.9.2 **TM02 Switch (/TM02)** - Use the /TM02 switch to alter the physical unit number of the TM02/TM03 formatter on the RH controller from the value set by the generated stand-alone version of DSC to the value required by the system you are using.

The stand-alone version of DSC is created with a physical unit number of 0 assigned to the TM02/TM03 formatter on the RH controller. You may change the physical unit number to any octal digit from 1 to 7 for each MM-type device. Consider the following example:

```
DSC>MM1:/TM02=1
DSC>command-string
```

The above command alters the TM02/TM03 position on the RH controller from the generated value, 0, to 1 for device MM1:. The /TM02 switch alters only the device you specify. If another MM device requires an altered assignment, which is the usual case, you must specify the new device and its assignment in a separate command. You can use the /TM02 switch only with MM-type devices; it cannot be specified with an MT or disk device.

2.9.3 **Unit Switch (/UNIT)** - The stand-alone DSC version is generated with and accepts only two logical unit numbers, 0 and 1. Not only is the number of devices that you can specify limited to two, but the unit numbers that must be used in the command string cannot be changed. These constraints can be amended somewhat by the use of the /UNIT switch. The numbers 0 and 1 must still be specified in the command string, and the number of devices cannot be increased; however, devices with physical unit numbers other than 0 and 1 can be accessed if you follow the example illustrated below:

```
DSC>DP0:/UNIT=5
DSC>
```

After you enter the above command and the command string that references device DP0:, the disk actually accessed is the disk assigned as physical unit 5. If disk DP1: also required a physical unit change, it would have to be specified in another command.

2.9.4 **Vector Address Switch (/VEC)** - The /VEC switch alters the stand-alone DSC vector addresses to the vector addresses required by the system you are using. Each unit of the device type is accessed by the specified vector address.

```
DSC>DB1:/VEC=320
DSC>
```

After the above example is entered, all DB-type devices will be accessed with a vector address of 320.

The stand-alone version of DSC uses nonstandard vector addresses to provide for conflicting unit configurations. These conflicts occur when a system contains:

- A TU16 drive and a TE10/TU10 drive or a TU16 drive and a TS03 drive
- Any combination of RP02/03, RP04/05/06, and RM03 (such as an RP02 disk and an RP04 disk).

NOTE

The stand-alone version of DSC is generated with some vector addresses that do not conform to the standard system addresses. Refer to Table 3 to determine if vector addresses require alteration from the system values.

For example, before referencing TE10, TU10, or TS03 tapes, the /VEC switch must be used to alter the DSC vector setting of 320 to the correct value of the system you are using.

```
DSC>MT1:/VEC=224
DSC>
```

After entering this example, all MT-type devices will be accessed with a vector address of 224 (instead of the DSC-generated vector address of 320).

If the /VEC switch is not used to alter the DSC setting, DCS hangs in a loop waiting for a response from the incorrect vector address. This response never comes.

3.0 DSC OPERATION

DSC's operation is a cycle consisting of either two or four data transfers. In a one step operation, DSC copies data from one disk and then writes the data to another disk. In a two step operation, data are:

- Copied from disk
- Written to tape
- Copied from tape
- Written to disk

The following sections describe the methods of DSC's operation in each of these four data transfer operations.

3.1 Data Transfer from Disk

After the DSC command specifying a disk copy operation is entered and accepted, the DSC utility begins the data transfer by scanning the input disk to ensure that it is in FILES-11 format. DSC begins transcribing data by copying an approximation 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 the construction of these files on the new disk.

If the transfer is specified 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 NON-MERGE 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 those 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.

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 will be displayed on the console.

To copy a disk, DSC performs the following three steps:

1. Verifies that the disk is online, is identified correctly and is in FILES-11 format.
2. Transcribes disk index files.
3. Copies data files.

NOTE

Only one disk can be specified 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 utilize more than one tape drive.

Tapes created by DSC serve as a backup of the disk contents, but cannot be used by themselves. You can only use DSC tapes efficiently by copying them back to a disk medium, 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.

When DSC begins copying the disk's contents to tape, it allows transcription to more than one tape. The first data block DSC writes to tape is a header which contains the volume name (obtained from the filelabel), and the relative volume number. This header identifies the tape volume set and the volume's place within that set, assuring that when DSC begins the disk restore operation, it will load 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, ensure that the tape devices are online and are identified correctly. You may specify multiple online tape drives in the following format:

```
DSC>AAnn(0):,AAnn(1):,...AAnn(7):filelabel=indev:
```

as in the following example:

```
DSC>MM00:,MM1:,MM04:,MM2:SYSFILE=DB1:
```

As shown, place a colon after each device identifier and separate the devices by commas. You have the option of entering a filelabel after specifying the last device. You can specify only one type of tape drive, either MM or MT, in a single DSC command. Although you can specify up to eight drives* per command, you can specify an individual tape drive only once.

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 order would be:

```
MM00:  MM1:  MM04:  MM2:  MM00:  MM1:  MM04:  MM2:  ...
```

until the data transfer is complete.

DSC performs the following four steps when creating magnetic tapes:

1. Verifies that the first or only volume of a set is on-line and write enabled.

2. Verifies that subsequent volumes of a tape set are at BOT, on-line when required, and correctly identified.

3. Transcribes data.

---

* Two drives in the stand-alone version

NOTE

Input device must be a disk. Valid tape options are:

```
/RW
/AP
/CMP (output tapes need not be write
      enabled for the /CMP function
/DENS=1600
/DENS=800:1600
/NMG
/VE
filelabel
```

3.3 Data Transfer from Tape

DSC can only use the tapes it creates to reconstruct a disk or in conjunction with 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 be identified correctly. The tape volumes must be specified so as to be accessed in the correct order.

DSC performs the following four operations when copying data from tape:

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

NOTE

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

If you do not specify a filelabel, DSC transfers only the first encountered file on the first volume of a set.

Valid options are:

```
/DENS=1600
/DENS=800:1600
/RW
filelabel
```

3.4 Data Transfer to Disk

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

To receive input, a disk must be online and identified correctly. You can specify any disk as the output device in any single operation which 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 /BAD switches to ensure that the data being written on the disk are accessible. You should update the bad block descriptor immediately preceding the operation by running the BAD program to eliminate the possibility of writing data to inaccessible blocks. If desired, you may supplement or override the bad block file by using the /BAD switches to manually enter bad blocks.

After identifying the bad blocks on the output disk, DSC examines that 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 enough blocks are not 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 were copied in MERGE mode, DSC would write the prime file header and its contents, and associated file extension headers and the extensions they map, as a unit to a contiguous series of blocks. If the /NMG switch were specified in the original disk copy operation, DSC would access each individual file header in index file order and transfer the contents of the blocks it maps to the lowest LBNs available on the output disk. Note that the output disk will contain 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 RP04) are restored to a smaller disk (such as an RK05).

Compression of 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, it is also possible to reduce the number of file extensions and extension headers.

When the DSC operation is concluded, the allocated blocks occupy the lowest LBNs available on the disk. Blocks that are available for use generally have higher LBNs and are also in a contiguous section.

It should be noted that when DSC writes to a disk, it begins transcribing data onto the lowest LBN possible. Data present on the disk in this area are 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 previously occupied the blocks.

DSC performs the following procedures when creating a disk:

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

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

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

4. Creates index and directory files.

5. Transcribes data files.

NOTE

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

Use the /NMG switch with an output disk only when the input device is also a disk.

Use the /BAD switches to override or supplement bad block data on the output disk.

4.0 DSC ERROR MESSAGES

DSC displays many messages on the console which provide information on errors, problems, or potential problems encountered in the DSC operations. Each message is prefixed with:

```
DSC --
```

which identifies it as a DSC error message. In most cases, the prefix is issued in conjunction with an identification of the type of message:

```
DSC -- *WARNING* error message text
```

or:

```
DSC -- *FATAL* error message text
```

followed by a diagnostic error message. In the first example above, where you receive a *WARNING*, the DSC operation in effect at the time continues after the message is displayed. If DSC issues a *FATAL* message, however, DSC terminates the current operation and issues a prompt for a new command line.

In some cases DSC issues a message which is neither a *WARNING* nor a *FATAL* message. Usually these are instructions with which you must comply if DSC is to continue the operation.

The DSC error messages are listed below in numeric order. The message text, exactly as displayed, appears first, followed by the meaning of the message, and concludes with instructions on what you should do to alleviate the condition.

The full text of the message appears only when using DSC on-line. The stand-alone version of DSC displays only the error number (text is suppressed) and the associated device identification when appropriate.

Examples:

On-Line
DSC -- *FATAL* 62 INDEX FILE ALLOCATION FAILURE device

Stand-alone
DSC -- *FATAL* 62 -- device

NOTE

Some of the DSC errors have been assigned a single letter code and only the code is displayed. The meanings of the coded error conditions are included in Table 4 to provide a quick reference for the user. A detailed description of the single letter code follows the respective numeric listing.

The following are the DSC error messages.

1 **UNDEFINED ERROR**

An unidentifiable internal error was encountered.

First, retry the operation. If error persists, submit a Software Performance Report.

2 **CONFLICTING DEV. TYPES**

An illegal combination of device types has been specified.

Check for typographical errors in device mnemonics, change so that disks and tape drives, or more than one type of tape drive are not specified on the same side of the command string.

3 **MIXED TAPE TYPES**

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

Re-enter the command specifying only one type of tape drive, MM or MT.

4 **ILLEGAL SWITCH**

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

Re-enter the command with all switches correctly specified.

5 **FILE LABEL TOO LONG**

A filelabel consisting of more than 12 characters was specified.

Correct the filelabel and retry the operation.

6 SYNTAX ERROR

An error in the command string format occurred.

Check the command and re-enter in correct order.

7 DUP. DEV. NAME

The same device was entered more than once in the command.

Re-enter the command string with the devices specified only once.

8 TOO MANY DEV'S

More than eight devices (two devices for the stand-alone version) have been specified on one side of the command.

Re-enter 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 retry 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 re-enter the command.

11 BAD BLOCK SYNTAX ERROR

A syntax error occurred when manually entering bad block data.

Check the command that was entered, and re-enter correctly.

12 BAD BLOCK COUNT TOO LARGE

Too many bad blocks have been 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 does not exist on the output disk.

Check the numbers of the blocks entered, and re-enter correctly.

14 OUTPUT TAPE ON device: NOT AT BOT

The specified continuation tape is not at load point.

Remount or reset the tape at load point and re-enter the command.

15 **OUTPUT TAPE device: FULL**

The specified tape is full, and cannot be appended to.

Re-enter the command, change the output tape.

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

An illegal append was attempted.

Re-enter the command and either omit the /AP switch to write to the specified tape, or change tapes.

17 **TAPE XXn:NOT ANSI FORMAT**

If XXn: is an output tape, an illegal append was specified.

Re-enter the command and either omit the /AP switch to write to the specified tape, or change tapes.

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

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

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

Re-enter the command and either omit the /AP switch or change tapes.

19 **TAPE XXn: A CONTINUATION TAPE**

If XXn: is an output tape, an illegal append was attempted. Append switch can only be used on the first volume of a tape set.

Re-enter the command, change output tape.

If XXn: is an input tape, the tape has been mounted out of sequence.

Re-enter the command and specify input tapes in proper order.

20 **CANNOT DETERMINE DENSITY OF TAPE device:**

The tape on the specified input tape drive cannot be used by the command string entered. The density of the tape cannot be determined.

Check if a 7-track tape is being used on a 9-track drive (or vice versa); a 1600 bits/in. tape is mounted on an 800 bits/in. drive; or if a hardware error exists.

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

A read error occurred when trying 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 re-enter the command.

22 FILE STRUCTURE LEVEL ON device: NOT SUPPORTED

The file structure level on the specified device cannot be used.

Replace the device and retry the operation.

23 I/O ERROR A ON device:

The message that follows explains why the specified file could not be read.

Retry the operation.

24 I/O ERROR B ON device:

The I/O error indicated by the message that follows explains why the file header on the device could not be read. The specified file is 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 cannot be read.

The disk is unusable and therefore cannot be copied.

26 I/O ERROR C ON device:

The following message explains the error that occurred while reading the specified file.

Retry the operation.

27 I/O ERROR D ON device:

A read error, as indicated by the diagnostic message which follows, occurred when reading 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 re-enter the command.

29 TOO MANY DISKS FOR SET

There are more disks (either input and/or output) specified than are defined for the volume set in the home block of the first input volume.

Correct the number of input disks and re-enter the command.

30 TOO FEW DISKS FOR SET

There are fewer disks (either input and/or output) specified than are defined for the volume set in the home block of the first input volume.

Correct the number of input disks and re-enter the command.

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

The message that follows explains the I/O error that occurred while reading the specified file header.

Retry the operation.

32 **INPUT DEVICE device: file id file number NOT PRESENT**

The specified file does not have a file header in the index file; the file is not copied.

This is a warning only. If desired, the operation may 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 specified input disk is not a Files-11 level one (ODS1) disk and cannot be used.

Retry the operation with a level one disk.

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 cause the specified file to be lost.

Retry the operation.

37 **INPUT DEVICE device: file id, SEQUENCE NUMBER CHECK**

The sequence number is 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 has been broken; the specified file is lost.

Retry the operation.

39 **DIRECTIVE ERROR**

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

Retry the operation.

40 I/O ERROR F ON device:

The message that follows indicates that the specified input or output device may cause a subsequent 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 re-enter the command.

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

An I/O error occurred which is explained by the message that follows 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 when copying the blocks 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 only a message informing the user that the copy operation is complete and DSC is initiating the verify pass (/VE specified).

46 RESUME COPYING

This is only a message informing the user that the verify pass (/VE specified) is complete 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 hit the carriage return key.

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

The tape position was lost while reading the input tape. The file specified in the message, as well as some subsequent files, may be lost. Additional error messages will probably occur.

Retry the operation from the beginning.

49 **OUTPUT DEVICE device: FULL**

The specified device is full and cannot accommodate data following the specified file. May indicate that more data were transferred than were expected due to an inconsistency in the input tapes.

Re-enter 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 is 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 is lost.

Retry the operation; a new disk may be required.

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

The message that follows explains the I/O error that occurred while writing the specified file.

Retry the operation.

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

When copying 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 preceding I/O error occurrence may have caused an inconsistency.

Retry the operation.

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

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

Replace the device and re-enter the command.

55 **INDEX FILE ALLOCATION FAILURE device:**

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

Replace the disk and re-enter 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 are invalid.

Run the BAD utility on the disk; manually enter bad block data; or re-enter the command, specifying another disk.

58 **BAD BLOCK FILE FULL device:**

Too many bad blocks exist on the output disk.

Replace the disk and retry 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 re-enter 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 new output disk and re-enter the command.

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

The tape position was lost when reading 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 while reading the data file specified. Data beyond the VBN mentioned are lost.

Re-create 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 while reading the tape mentioned in the message. All of "y" and some of "x" are lost.

Retry the entire operation.

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

An inconsistency occurred when writing 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 is 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:**

The following message explains the error that occurred while reading the specified file.

Retry the operation.

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

The message that follows explains the I/O error that occurred while writing the specified file.

Retry the operation.

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

An I/O error (which follows) occurred when reading 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 beginning of tape or its load point. This message is also displayed during a /VE operation merely 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, re-enter in proper 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. When trying to read an attribute block, some other block was accessed. The file following the file specified in the error message is lost.

Retry the operation.

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

The message that follows explains the I/O error that occurred while reading the specified file.

Retry the operation.

73 I/O ERROR L ON device:

The message that follows explains the I/O error that occurred while reading the file header.

Retry the operation.

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

The tape position has been recovered. Some data preceding the file specified were lost.

This is usually received in conjunction with one or more error messages, all indicating that the input tape was either read incorrectly or recorded badly. The tape should be re-created and the operation re-initiated.

75 TAPE FILE filelabel NOT FOUND ON device:

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

Check the filelabel and the tape, re-enter when the correct tape and filelabel 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 re-generated.

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

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

Retry the operation.

78 I/O ERROR M ON device:

The following message explains why the specified file could not be read.

Retry the operation.

79 INDEX FILE DATA NOT PRESENT device:

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

Re-create the tape, or retry the same tape on a different tape drive.

80 I/O ERROR N ON device:

The message that follows explains the I/O error that occurred while restoring 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 incomplete data are contained.

Check the tape and re-enter the command.

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

The message that follows explains the I/O error that occurred while writing the specified file header.

Retry the operation.

NOTE

In both the on-line and stand-alone versions of 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 has occurred; or the block is bad.

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

BAD BLOCK ON DEVICE

A device malfunction has occurred, or a tape was used with bad data on it 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 is larger than was expected; the tape got out of position, or is in the wrong format.

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

DEVICE NOT READY

The device is not ready or not up to speed, or a blank tape has been 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 the device, the device specification in the command string, and re-enter the command.

DEVICE WRITE LOCKED

The disk drive is write locked.

Write enable the disk drive and re-enter 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 has occurred.

Retry; if error repeats call DIGITAL Field Service.

HANDLER NOT RESIDENT

The device handler has not been loaded.

Load the appropriate device handler and retry the operation.

INSUFFICIENT POOL SPACE

The operating system is overloaded.

Retry the operation.

PARITY ERROR ON DEVICE

A device malfunction or media incompatibility has occurred.

Retry the operation.

PRIVILEGE VIOLATION

A device has been mounted as FILES-11.

RSX-11M users: DMOunt the disk and retry the operation.

IAS and RSX-11D users: DMOunt the disk, MOUnt as a foreign device and retry the operation.

UNKNOWN SYSTEM ERROR

An undefinable I/O error has occurred.

Retry the operation.

The following error messages appear only in the stand-alone version.

ILLEGAL VECTOR ADDRESS

Vector addresses must be a multiple of four (4) and less than or equal to 374(8).

Correct the /VE specification and re-enter the command.

INVALID CSR ADDRESS

System trap occurred when specified CSR address was referenced.

Correct the address and re-enter the command.

INVALID TM02 ASSIGNMENT

The /TM02 switch applies only to TU16/TE16/TU45 tapes and cannot specify an assignment greater than seven (7).

Correct the error and re-enter the command.

SPECIFIED UNIT NUMBER EXCEEDS MAX. OF 1

The stand alone version does not accept unit numbers greater than 1.

Correct the error and re-enter the command. Specify the /UNIT switch if required.

Table 4
General Error and I/O Error Message Codes

General Error Message Codes	
Symbol	Meaning
Code A	Failed to read storage map header
Code B	Input data out of phase
Code C	Non-data 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 Codes	
Symbol	Meaning
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

(continued on next page)

Table 4 (Cont.)
General Error and I/O Error Message Codes

General Error Message Codes	
Symbol	Meaning
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

NOTE: For detailed description consult numeric listing

INDEX

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Did you find errors in this manual? If so, specify by page.

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

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Is there sufficient documentation on associated system programs required for use of the software described in this manual? If not, what material is missing and where should it be placed?

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