

KL10261: DSRB! [30,5637] F3. mem

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1.0 Introduction and Overview

This document is intended to describe the various record formats that the LCG tape utilities, Backup and Dumper, produce. For people interesting in learning about Backup's record formats, you will probably find enough information in the section on Backup. For those seeking to learn about Dumper, you had best read everything. In order to understand how Dumper fails to faithfully follow the Interchange format, you should understand how it is supposed to be done by reading about Backup.

WARNING

This document is not intended for the beginner. This document is a reference guide to the record formats. It is suggested that you carefully read the entire document before attempting to use the information. Each section contains information that you will need to know before being able to understand the next section. Each section builds up on the information presented previously. Therefore if you decided to start in the middle and encounter a problem, you probably could have avoided it by reading everything first.

1.1 Sources of Information

Backup and Dumper appear to come from two separate realities. Historically Dumper was written before Backup, but the Interchange mode that they both share is based on the way that Backup does things.

The reader is expected to be able to find out some information on his own. For example, when the various parts of TOPS-10 file RIB or a TOPS-20 FDB are being discussed, it is expected that you can use your Notebook sets to find the appropriate data. (This information can be found in the respective Monitor Calls Reference Guide for your system.) This document will not take the time to explain information readily available in the notebooks except to point out where you can find it.

For TOPS-20 people, recommended reading is the Tape Processing Manual which currently lives in Notebook 16. This will give you a basic understanding of how tapes are supposed to work, how the information is put onto the tape, the differences between labeled and unlabeled tapes, and the format of the tapes in terms of tape files, tape marks, and other system considerations. For those of you who don't have TOPS-20 notebook sets the order number is AA-H180A-TM.

For TOPS-10 people about all you will find is the Backup guide stuck in Appendix F of the Operators Guide, which is in Notebook 15.

Another place to find information is the source code to Backup. Run the source files through RUNOFF and you will get .PLM files. These Program Logic Manuals are somewhat informative, but they are aimed at the engineer/maintainer who works regularly with the internal code.

Basically, the reader should have available the Monitor Calls Reference Guide for their particular system, the users guide for their favorite mastape utility, and a copy of the source code. The reader of this document is expected to be an experienced MACRO programmer and be familiar with the internal workings of their operating system (TOPS-10 or TOPS-20). This document can also be used as a debugging aid to figure out if/how your tape possibly got corrupted, but where to set break points and how to examine the incommings/outgoings buffers is left to the reader. (Hint: the Backup .PLM manual tells you where the input/output routines are and Dumper uses the DUMPO/DUMPI Jsys to put the data to tape.)

2.0 Definitions and Conventions

This section will attempt to set some conventions and explain some definitions that occur in this document. This is *****NOT***** a primer on how mastapes work.

Record

A record is one buffer of information written/read to tape. A record is made up of a header section and a data area.

Header

A header is at the top of a record. A header contains information about the contents of the record such as the checksum and the sequence number of the record. The header information is an unique identifier for each record on the tape.

Data Area

The data area of a record is where the contents of a disk file or other types of file information are stored. The data areas for both Backup and Dumper are one page in length. This size conveniently holds 1 page of disk data. Room is not reserved in the header area for variable length information about a file such as the filename, the user name, or the path of the directory. This kind of information can be found in the data area. With only one exception, you will not find disk data and variable information in the data area at the same time.

Record Type

There are different types of records. Not all records contain disk file data. There are records that indicate the start and the end of a disk file, there are records which indicate the start and the end of a saveset (tape file). Each record type is given a different numeric value to distinguish it from the rest.

Sequence Numbers

A sequence number is given to each record on a tape. The first record is given a sequence number of one, the second a sequence number of two, and so on. If a record is duplicated on tape due to an error on write, a sequence number will be repeated to indicate that both records are supposed to contain identical information. Therefore if there is an error

in reading the record back and then the next record contains the same sequence number, then that record has a second chance at being restored successfully.

Relative Tape Numbers

Relative tape numbers are issued in the same manner as record sequence numbers. All of the files saved on the first tape of tape volume will have a relative tape number of one, files saved onto the next continuation tape will have a relative tape number of two, and so on.

Tape Label

A tape label is a record which identifies the tape. It is the first record written to tape and can contain such information as density, parity, system information and reel-id of the tape. System software will read this information and set parameters with it.

3.0 Labeled and Unlabeled Tapes

TOPS-20 is the only LCG system that writes labeled tapes at this point in history. Labeled tapes for TOPS-10 is comming at some point in the future. Labeled tapes contain "extra" records which identify the start of a volume, start of a saveset, end of a saveset, etc. These records will not be discussed here because they are supposed to be transparent to the user and they are already described in the Tape Processing Manual. The only warning that should be heeded about labeled tapes is that they only work when the software to read those labels is running (IE, MOUNTR, GALAXY). You cannot expect to use labeled tapes for INTERCHANGE mode between 10 and 20. Dumper will not handle labeled tapes without GALAXY/MOUNTR running as well.

Then there are unlabeled tapes. Currently, all the tapes that TOPS-10 produces are unlabeled. Unlabeled tapes contain only the records that are dicussed in this document.

4.0 Backup Tape Format

All records have a standard length of 544(10) words. The first 32(10) words are the header and the remaining 512(10) words are the data area. All undefined or unused words are written with zeros and ignored on read. This maximizes the probability of reading old tapes.

4.1 Record Types

Name	Value	Contents
T\$LBL	1	Tape Label - Must be at start of tape.
T\$BEG	2	Saveset Header - includes o Saveset name o Device o System - Must be first record of saveset
T\$END	3	- Saveset Trailer - identical to T\$BEG in format
T\$FIL	4	- data record
T\$UFD	5	- contains directory information - is used to rebuild directory - not written in Interchange mode
T\$EOV	6	- end of volume
T\$COM	7	- comment record (ignored)
T\$CON	10	- continuation of saveset - same as T\$BEG in format

4.2 Standard Record Format

The first 12 words of the header are identical for every record. Words zero through 6 and 13 are already defined. Words 7 through 12 are empty for future use. In Interchange mode, the customer word will be set to zero on write and ignored on read.

Word	Name	Contents
Word 0	(G\$TYPE)	Contains record type value.
Word 1	(G\$SEQ)	Sequence number of record. This is incremented by one for each record on the tape. If a record is repeated because of a tape write error, the number of the repeated record is the same as that of the original.
Word 2	(G\$RTNM)	Relative tape number.
Word 3	(G\$FLAG)	Various flags about the record.
	GF\$EOF	(1B0) Last record of disk file.
	GF\$RPT	(1B1) Repeat of last record.
	GF\$NCH	(1B2) Ignore checksum.
	GF\$SOF	(1B3) Start of file.
	GF\$UFE	Disk error.
Word 4	(G\$CHK)	Checksum of record.
Word 5	(G\$SIZ)	Number of words used as data.
Word 6	(G\$LND)	Number of words to skip before data starts.
Word 13	(G\$CUSW)	Customer word.

4.3 Non-data Information Blocks

Non-data information blocks start with a control word containing the numeric type of the information block in the left half, and the length of the block (including the control word) in the right half. More than one type of non-data information block may appear per record. These non-data blocks will appear in the data section of the record. They do not contain the contents of the file, they are merely pieces of information about the disk file being written on tape.

Value	Name	Contents
1	O\$NAME	Path identification of file
2	O\$FILE	File information
3	O\$DIRT	Directory information
4	O\$SYSN	System header
5	O\$SSNM	Saveset name

4.3.1 O\$NAME block

- full path identification of file without punctuation
- uses subblocks to store information
 - o device
 - o directories (top-down order)
 - o file
 - o extension
 - o version
 - o generation
- each sub-block headed by a control word of:
[type,length]
- information is ASCII string terminated by a null
- omitted fields are defaulted
- in Interchange only name, ext, and version are written

4.3.2 O\$FILE (File Information)

The O\$FILE block contains file attribute information. The first section of this block is a fixed length header area containing in fixed locations either single word attributes or byte pointers to ASCII strings attributes located in the remaining section. All dates and time are in universal date/time format. In Interchange mode only the critical attributes (starred) will be written, and the rest of this block will contain zeros. In the description which follows, the symbols in brackets represent the RIB data from which the attribute values will be converted.

	Name	Value	Contents
(*)	A\$FHLN	0	Fixed header length in words
	A\$FLGS	1	flags
	B\$PERM	(1B0)	Permanent [RP,NDL]
	B\$TEMP	(1B1)	Temporary
	B\$DELE	(1B2)	Already deleted
	B\$DLRA	(1B3)	Don't delete [RP,ABU]
	B\$NQC	(1B4)	Not quota checked [RP,NQC]
	B\$NDCS	(1B5)	No valid checksums [RP,ABC]
	B\$CSER	(1B6)	Checksum error [RP,FCE]
	B\$WRER	(1B7)	Disk has write error [RP,FWE]
	B\$MRER	(1B8)	Backup read error on restore [RP,BFA]
	B\$DAER	(1B9)	Bad by damage assesment [RP,BDA]
(*)	A\$WRIT	2	Date/Time of last write [RB,CRD, RB,CRT]
(*)	A\$ALLS	3	Allocated size in words [.,RBALC]
(*)	A\$MODE	4	Mode of last write [RB,MOD]
(*)	A\$SIZ	5	Length (bytes) [.,RBSIZ]
(*)	A\$BSIZ	6	Byte size (7 or 36)
(*)	A\$VERS	7	Version (.,JBVER format) [.,RBVER]
	A\$PROT	10	Protection [RB,PRV]
	A\$ACCT	11	Byte pointer to account string
	A\$NOTE	12	Byte pointer to annotation string [.,RPSPL]
	A\$CRET	13	Creation date and time of this generation
	A\$REDT	14	Last read (date/time) [RB,ACD]
	A\$MODT	15	Monitor set last write [.,RMTIM]
	A\$ESTS	16	Estimated size (words) [.,RBEST]
	A\$RADR	17	Requested disk address [.,RBPOS]
	A\$FSIZ	20	Max file size (words)
	A\$MUSR	21	Byte pointer to last modifier
	A\$CUSR	22	Byte pointer to last creator [.,RBAUT]
	A\$BKID	23	Byte pointer to BACKUP-id [.,RBMTA]
	A\$BKDT	24	Date/Time of last Backup
	A\$NGRT	25	Number of generations to retain
	A\$NRDS	26	Number of opens for read this generation
	A\$NWRT	27	Number of opens for write this generation
	A\$USRW	30	Undefined User word [.,RBNCA]
	A\$PCAW	31	Privid Customer word [.,RBPCA]

The following is a constant value rather than word with contents.

LN\$AFH 32 Length of fixed header

4.3.2.1 Protection codes (A\$PROT) -

The protection for directories appears in the directory attribute block (0\$DIRT). For files, the protection word has four fields of eight bits with a "5" in the leftmost three bits to prevent from looking like a byte pointer.

Bits 0-2	"5"
Bit 3	Reserved for future expansion
Bits 4-11	Future access
Bits 12-19	Owner access
Bits 20-27	Affinity group access
Bits 28-35	"World" access

Each access field is sub-divided into bytes which represent the attribute, write and read protections associated with the file.

Name	Value	Contents
PR\$SPC	(Bit 28)	Reserved for special checking
PR\$ATR	(Bits 29-31)	Attribute sub-field of 3-bit bytes
	0	File completely hidden
	1	File name is visible (7-6)
	2	File attributes are visible (5-2)
	3	Can change unprotected attributes
	4-5	Reserved for future expansion
	6	Can change protection
	7	Can delete the file (1)
PR\$WRT	(Bits 32-33)	Write access sub-fields
	0	No write access (7-5)
	1	Append (4)
	2	Write (3)
	3	Superseding generation (2-0)
PR\$RED	(Bits 34-35)	Read access sub-fields
	0	No read access (7)
	1	Execute only (6)
	2	Can read the file (5-0)
	3	Reserved for future expansion

4.3.3 O\$DIRT (Directory Attribute Information)

The O\$DIRT block contains directory attributes (not written in Interchange mode). The first section of this block is a fixed length header area containing either directory attributes or pointers to attributes located in the remaining section. The symbols in brackets represent the RIB data used for conversion (the location is zero if none is given). The directory protection word appears in this block rather than in the O\$FILE block (A\$PROT is zero for directories).

Name	Value	Contents
D\$FHLN	0	Fixed header length in words.
D\$FLGS	1	Directory flags.
DF\$FOD	(1B0)	Files only directory
DF\$AAL	(1B1)	Alpha accounts are legal
DF\$RLM	(1B2)	Repeat login messages
D\$ACCT	2	Account number or ASCII byte ptr to account string.
D\$PROT	3	Directory protection [RP,PRV].
D\$FPRT	4	Default file protection.
D\$LOGT	5	Date/time of last login [RB,CRD and RB,CRT].
D\$GENR	6	Default number of generations to keep.
D\$QTF	7	First-come-first-served logged-in quota (words) [RBQTF].
D\$QTO	10	Logged out quota in words [RBQTO].
D\$ACSL	11	List of groups that can access this directory.
D\$ISRL	12	List of groups that the user is in.
D\$PRVL	13	Privilege list.
D\$PSWD	14	ASCII byte pointer to password.

4.3.4 O\$SYSN (System Header Information)

This block contains system header line in an ASCIIZ string.

4.3.5 O\$SSNM (Saveset Name)

This block contains the user supplied saveset name in ASCIIZ (max of 30 characters). This block is omitted if no saveset name was specified.

4.4 Backup Record Formats

4.4.1 T\$LBL Record

The T\$LBL record contains only header information. There is nothing stored in the data area.

Word	Name	Contents
Word 0	(G\$TYPE)	Record Type
Word 1	(G\$SEQ)	Sequence number of record
Word 2	(G\$RTNM)	Relative tape number
Word 3	(G\$FLAG)	Flags
Word 4	(G\$CHK)	Checksum of record
Word 5	(G\$SIZ)	Number of words used as data
Word 6	(G\$LND)	Number of words to skip before data starts
Word 13	(G\$CUSW)	Customer word
Word 14	(L\$DATE)	Date/Time (Universal format)
Word 15	(L\$FMT)	Tape format version (1)
Word 16	(L\$BVER)	Version number (.JBVER) of Backup
Word 17	(L\$MON)	%CNMNT monitor type
Word 20	(L\$SVER)	%CNDVN system version
Word 21	(L\$APR)	Processor serial number (integer)
Word 22	(L\$DEV)	SIXBIT device written by
Word 23	(L\$MTCH)	Tracks; density
Word 24	(L\$RLNM)	SIXBIT reel-id
Word 25	(L\$DSTR)	Date/Time before tape cannot be scratched
Word 37	(L\$CUSW)	Customer Word

4.4.2 T\$BEG, T\$END, T\$CON Records

These records all contain the same information. They also contain O\$SYSN and O\$SSNM blocks in their data areas. They are distinguished by their record types and their occurrence on tape.

Word	Name	Contents
Word 0	(G\$TYPE)	Record Type
Word 1	(G\$SEQ)	Sequence number of record
Word 2	(G\$RTNM)	Relative tape number
Word 3	(G\$FLAG)	Flags
Word 4	(G\$CHK)	Checksum of record
Word 5	(G\$SIZ)	Number of words used as data
Word 6	(G\$LND)	Number of words to skip before data starts
Word 13	(G\$CUSW)	Customer word
Word 14	(S\$DATE)	Universal Date and Time
Word 15	(S\$FMT)	Format version (BKFMT)
Word 16	(S\$BVER)	Backup version (JBVER)
Word 17	(S\$MON)	%CNMNT monitor type
Word 20	(S\$SVER)	%CNDVN system version
Word 21	(S\$APR)	Processor serial number (integer)
Word 22	(S\$DEV)	SIXBIT device written by
Word 23	(S\$MTCH)	Tracks; density
Word 24	(S\$RLNM)	SIXBIT reel-id
Word 25	(S\$LBLT)	Octal label type
Word 37	(S\$CUSW)	Customer Word

4.4.3 T\$UFD Record

This record contains the information needed to re-create a .UFD. This record is not written in Interchange format. When written, the data portion contains two or three non-data blocks: types O\$NAME, O\$FILE (optional) and O\$DIRT in the data section.

Word	Name	Contents
Word 0	(G\$TYPE)	Record Type
Word 1	(G\$SEQ)	Sequence number of record
Word 2	(G\$RTNM)	Relative tape number
Word 3	(G\$FLAG)	Flags (none)
Word 4	(G\$CHK)	Checksum of record
Word 5	(G\$SIZ)	Number of words used as data
Word 6	(G\$LND)	Number of words to skip before data starts
Word 13	(G\$CUSW)	Customer word
Word 14	(D\$PCHK)	Path Checksum
Word 15	(D\$LVL)	UFD level (0=UFD, 1= first SFD, etc)
Word 16	(D\$STR)	File structure name
Word 37	(D\$CUSW)	Customer word

4.4.4 T\$FIL Record

This record contains file data. On the first record, an O\$NAME and an O\$FILE information block is written. File data is put in the first record only if all of the file contents will fit in the block, otherwise file data starts with the next (second) record.

Word	Name	Contents
Word 0	(G\$TYPE)	Record Type
Word 1	(G\$SEQ)	Sequence number of record
Word 2	(G\$RTNM)	Relative tape number
Word 3	(G\$FLAG)	Flags
Word 4	(G\$CHK)	Checksum of record
Word 5	(G\$SIZ)	Used only in first data record
Word 6	(G\$LND)	Used only in first data record
Word 13	(G\$CUSW)	Customer word
Word 14	(F\$PCHK)	Path checksum of file
Word 15	(F\$RDW)	Relative data word
Word 16	(F\$PTH)	12 word block for path info
Word 37	(F\$CUSW)	Customer word

5.0 Dumper Tape Formats

Dumper has two distinctly different record formats. One is the mode that Dumper ordinarily uses by default, and the second is used for INTERCHANGE mode.

Although Dumper uses only two different types of record formats, it will use different types of hardware data modes within those records. The INDUSTRY compatible switch will change the hardware mode from the standard unbuffered dump mode to industry compatible mode as defined in the TOPS-20 Monitor Calls Reference Guide.

5.1 Standard Dumper Format

Each physical record of the tape is 518(10) words long. The first 6 words contain the checksum, access, tape number, page number, type of record, and sequence number of the record. The remaining 512(10) words of the record contains either 1 page of disk data or information related to the type of record being written.

The following block description is pulled out of the source code of Dumper.

FORMAT OF DUMPER TAPES

Each physical record written by Dumper contains one or more logical records, each of which 518 (1006 octal) words long.

Each logical record has the following format:

CHKSUM	0	=====	CHECKSUM OF ENTIRE 518-WORD RECORD	=====
ACCESS	1	-----	PAGE ACCESS BITS (CURRENTLY NOT USED)	-----
TAPNO	2	SCD!	SAVESET <u>5</u> NUMBER <u>17</u>	TAPE <u>6</u> NUMBER <u>35</u>
PAGNO	3	F1!F2!	FILE <u>10</u> IN SET <u>13</u>	PAGE <u>16</u> IN FILE <u>35</u>
TYP	4		RECORD TYPE CODE (NEGATED)	
SEQ	5		RECORD SEQUENCE NUMBER (INCREASES BY 1)	
			=====	
			CONTENTS OF FILE PAGE IF DATA RECORD	
			OTHER TYPES HAVE OTHER INFORMATION HERE	
			=====	

TYPE	VALUE	MEANING
------	-------	---------

-----	-----	-----
DATA	0	Contents of file page
TPHD	1	Non-continued saveset header
FLHD	2	File header (contains filespec, FDB)
FLTR	3	File trailer
TPTR	4	Tape trailer (occurs only after last saveset)
USR	5	User directory information
CTPH	6	Continued saveset header
FILL	7	No meaning, used for padding

SCD (3 bits)

0=Normal save
1=Collection
2=Archive
3=Migration

F1	F2	Meaning
---	---	-----
0	0	Old-format tape (no file # in PAGNO bits 2-17)
1	1	Old-format tape, continued file
0	1	New-format tape (file # in PAGNO bits 2-17)
1	0	New-format tape, continued file

L if
Continued
file

L if = TFL, file # is valid

A Dumper tape is a collection of records organized in the following fashion:

```
=====
|                                     |
|      HEADER FOR FIRST SAVESET (TPHD)      |
|-----|
|      USER INFO (USR) OR FILE (SEE BELOW)  |
|-----|
|      USER INFO OR FILE                    |
|-----|
|      .                                     |
|      .                                     |
|      .                                     |
|-----|
|      HEADER FOR SECOND SAVESET (TPHD)      |
|-----|
|      USER INFO (USR) OR FILE (SEE BELOW)  |
|-----|
|      USER INFO OR FILE                    |
|-----|
|      .                                     |
|      .                                     |
|      .                                     |
|-----|
|                                     |
|      SUBSEQUENT SAVESETS                  |
|-----|
|                                     |
|      LAST SAVESET                         |
|-----|
|                                     |
|      TAPE TRAILER (TPTR)                  |
|-----|
```

Notes:

1. On labeled tapes, the TPTR record appears only if the saveset is continued on another tape.
2. Solitary tape marks (EOF's) are ignored on input. Two consecutive tape marks are interpreted as TPTR.
3. On labeled tapes, each saveset occupies exactly one file.
4. The first record of a continued saveset is CTPH instead of TPHD.

A disk file saved on a Dumper tape always has this sequence of records:

```
!=====!  
!               FILE HEADER (FLHD)               !  
!-----!  
!          DATA RECORD: 1 PAGE OF FILE (DATA)      !  
!-----!  
!          DATA RECORD: 1 PAGE OF FILE (DATA)      !  
!-----!  
!               ,  
!               ,  
!               ,  
!-----!  
!               FILE TRAILER (FLTR)                !  
!=====!
```

5.1.1 Types of Physical Records

There are eight types of records that Dumper can write to tape

TYP	Name	Contents
0	DATA	1 page of disk data
1	TPHD	Saveset Header
2	FLHD	File Header
3	FLTR	File Trailer
4	TPTR	Tape Trailer (after last saveset)
5	USR	User-Directory Information
6	CTPH	Continuation Header
7	FILL	Padding

5.1.2 Data Record (record type 0)

A DATA record contains the following information.

Word	Location	Contents
Word 0	CHKSUM	Checksum of record
Word 1	ACCESS	(not used)
Word 2	TAPNO	Relative Tape Number
Word 3	PAGNO	Page Number in File
Word 4	TYP	Record Type Code (negated) [0]
Word 5	SEQ	Record Sequence Number
Word 6-1005		One page of disk file data

5.1.3 Saveset Header (record type 1)

The Saveset Header contains the name of the saveset as given with the SSNAME command, the current tape format number and the date and time. The current record format for Dumper is 4 as defined by CURFMT. The date and time are in the universal date and time format. This record is the first record of every saveset.

Word	Location	Contents
------	----------	----------

Word 0	CHKSUM	Checksum of record
Word 1	ACCESS	(not used)
Word 2	TAPNO ✓	Relative Tape Number ✓
Word 3	PAGNO ✓	Page Number in File
Word 4	TYP ✓	Record Type Code (negated) [-1]
Word 5	SEQ ✓	Record Sequence Number
Word 7	BFMSG ✓	3
Word 10	BGNTAD ✓	Universal date and time
Word 11	SSNBUF ✓	Saveset name, ASCII strings

6 ✓ Record format

BFMSG 1 - PTR TO SSNAME
BFNTAD 2 - UDT of save
BFMSG 3 - SSNAME

5.1.4 File Header (record type 2)

The file header record contains the ASCII name of the file as well as the contents of that file's FDB. This record is the first record of every file.

Word	Location	Contents
Word 0	CHKSUM	Checksum of record
Word 1	ACCESS	(not used)
Word 2	TAPNO	Relative Tape Number
Word 3	PAGNO	Page Number in File
Word 4	TYP	Record Type Code (negated) [-2]
Word 5	SEQ	Record Sequence Number
Word 6		ASCII file name of the form: str:<dir>file.ext;sen;P(Protection);A(account)
Word 20/6	FDB	30 words of files FDB starting at word 0 10 words, ASCII author strings 10 words, ASCII last writer strings 6 words containing archive information

FH Nam = 0
FH FDB = 200

The FDB is broken up when stored. Only the first 30 words are stored in their original contiguous form. The words for the author and last writer strings contain offsets to the 10 word blocks where the ASCII strings are actually stored. Finally the last 6 words of the FDB, which contains archive information, is stored in the same order as in the FDB. This became split because archiving and extending FDBs were added in version 4 of TOPS-20. You will find the FDB stored in this "broken-up" fashion in other Dumper tape records as well.

5.1.5 File Trailer (record type 3)

The File Trailer record contains the FDB of the file. This record is the last record written for every file.

Word	Location	Contents
Word 0	CHKSUM	Checksum of record
Word 1	ACCESS	(not used)
Word 2	TAPNO	Relative Tape Number
Word 3	PAGNO	Page Number in File
Word 4	TYP	Record Type Code (nesated) [-3]
Word 5	SEQ	Record Sequence Number
Word 6	FDB	30 words of files FDB starting at word 0 10 words, ASCII author strings 10 words, ASCII last writer strings 6 words containing archive information

5.1.6 Tape Trailer (record type 4)

This record is the same in format as the File Trailer record. This record is written only at the end of the last saveset written to tape. There is no saveset trailer record for every saveset as there is in Backup on TOPS-10.

Word	Location	Contents
Word 0	CHKSUM	Checksum of record
Word 1	ACCESS	(not used)
Word 2	TAPNO	Relative Tape Number
Word 3	PAGNO	Page Number in File
Word 4	TYP	Record Type Code (negated) [-4]
Word 5	SEQ	Record Sequence Number
Word 6	FDB	30 words of files FDB starting at word 0 10 words, ASCII author string 10 words, ASCII last writer string 6 words containing archive information

5.1.7 User-directory Information (record type 5)

This record contains all the needed information to rebuild a user's directory. This information is set up to be taken as the argument block to the CRDIR jsys. See the CRDIR jsys for a more detailed explanation of the values contained in the argument block.

This record appears on the tape before the first file saved in that directory. User-directory information can only be saved by privileged users (WHEEL or OPERATOR) with their capabilities enabled.

Word	Location	Contents
Word 0	CHKSUM	Checksum of record
Word 1	ACCESS	(not used)
Word 2	TAPNO	Relative Tape Number
Word 3	PAGNO	Page Number in File
Word 4	TYP	Record Type Code (nesated) [-5]
Word 5	SEQ	Record Sequence Number
Word 6		Length of argument block (20)
Word 7		Password Pointer (offset)
Word 10		Working disk Quota (octal)
Word 11		Capabilities
Word 12		mode word
Word 13		Permanent disk quota (octal)
Word 14		Directory number (octal)
Word 15		n,,File protection default
Word 16		n,,directory protection
Word 17		Default Number of generations to keep
Word 20		Date of last login (universal)
Word 21		Address (offset) to user group list
Word 22		Address (offset) to directory group list
Word 23		Maximum number of Sub-directories
Word 24		Address (offset) of user group list
Word 25		Byte pointer to default account string
Word 65		Password
Word 105		Account string
Word 205		User group list
Word 405		Directory Group list
Word 605		User group list

UH Name =
PSW =
AC
Ab Len
C00G
C00G
C0SG

UH Name	= 40	Name String
PSW	= 60	PW "
Act	100	Act
Alg Len	200	Usergrp length
CDUG	200	Usergrp
CODG	400	Dir Grps
CDSG	600	Subdirgrp

5.1.8 Continuation Header (record type 6)

This record is the same in format as the Saveset Header record. This header is written only when a saveset must be continued from the end of one reel onto another.

Word	Location	Contents
Word 0	CHKSUM	Checksum of record
Word 1	ACCESS	(not used)
Word 2	TAPNO	Relative Tape Number
Word 3	PAGNO	Page Number in File
Word 4	TFP	Record Type Code (nesated)[-6]
Word 5	SEQ	Record Sequence Number
Word 6	BFMSG	3
Word 7	BGNTAD	Universal date and time
Word 10	SSNBUF	Saveset name, ASCIIZ string

5.2 Interchange Format Dumper Tapes

Interchange tapes were originally supported to take information from a DECsystem-10 to a DECSYSTEM-20. However, it is commonly used as a means of transporting files, via tape, to either system. Dumper attempts to copy the Interchange format as defined in Backup. There are some system dependencies such as the existence of end of file marks between savesets that cause glitches in the exchange of tapes.

Dumper makes up a tape record as if it were writing an ordinary Dumper tape, and at the last minute, converts that record into the equivalent Backup Interchange record. Dumper determines the maximum buffer length by taking the largest header it knows about (Interchange mode, 32(10)) and adds a page plus one to it (512(10) 1). So when Dumper goes off and creates Interchange records, it doesn't have to expand the buffer space in the program, it just keeps shuffling things down to the end.

Dumper does not fill all of the fields that Backup does in Interchange formats. Items such as the physical device the tape was written on and the CPU number of the system used are missing.

In the following record descriptions, all the words are named. The contents of those words are written by Dumper only if something is mentioned in the "Contents" field of a line.

The records are described in order as if there were "ordinary" Dumper records (ie, record type 0 through 7). The description which follows is the end-result of Dumper's effort of converting the "ordinary" record into an Interchange record.

Dumper always sets the GF\$NCH (ignore checksum) bit of the G\$FLAG word, and then (of course) proceeds to put the checksum from the -20 into the G\$CHK word anyways.

5.2.1 Interchange Data Record (record type 0)

This record starts out as a normal data record. This record is analasous to a T\$FIL record as written by Backup.

Word	Name	Contents
Word 0	(G\$TYPE)	Record Type
Word 1	(G\$SEQ)	Record sequence Number
Word 2	(G\$RTNM)	Relative Tape Number
Word 3	(G\$FLAG)	GF\$EOF!GF\$NCH
Word 4	(G\$CHK)	Checksum (ignored)
Word 5	(G\$SIZ)	ICOLEN
Word 6	(G\$LND)	
Word 13	(G\$CUSW)	Customer Word
Word 14	(F\$PCHK)	
Word 15	(F\$RDW)	Relative Block Number
Word 16	(F\$PTH)	
Word 37	(F\$CUSW)	Customer Word
Word 40		Data

5.2.2 Interchange Tape Header (record type 1)

This Saveset header is stored in this record. This is analogous to a T\$BEG record in Backup.

Word	Name	Contents
Word 0	(G\$TYPE)	Record Type
Word 1	(G\$SEQ)	Record sequence Number
Word 2	(G\$RTNM)	Relative Tape Number
Word 3	(G\$FLAG)	GF\$NCH
Word 4	(G\$CHK)	Checksum (ignored)
Word 5	(G\$SIZ)	
Word 6	(G\$LND)	Word count of saveset name
Word 13	(G\$CUSW)	Customer Word
Word 14	(S\$DATE)	Universal Date and Time
Word 15	(S\$FMT)	BKFMT (1)
Word 16	(S\$BVER)	expected but not provided
Word 17	(S\$MON)	expected but not provided
Word 20	(S\$SVER)	expected but not provided
Word 21	(S\$APR)	expected but not provided
Word 22	(S\$DEV)	
Word 23	(S\$MTCH)	
Word 24	(S\$RLNM)	
Word 25	(S\$LBLT)	
Word 37	(S\$CUSW)	
Word 40	(D\$SSNM)	5,,word count of saveset name
Word 41		Saveset name, ASCIZ string

5.2.3 Interchange File Header (record type 2)

The file header record in Interchange mode contains only system independent data about the file. This record is analogous to a T\$FIL record in Backup.

Word	Name	Contents
Word 0	(G\$TYPE)	Record Type
Word 1	(G\$SEQ)	Record sequence Number
Word 2	(G\$RTNM)	Relative Tape Number
Word 3	(G\$FLAG)	GF\$NCH!GF\$SOF
Word 4	(G\$CHK)	Checksum (ignored)
Word 5	(G\$SIZ)	
Word 6	(G\$LND)	F\$NND (400)
Word 13	(G\$CUSW)	Customer Word
Word 14	(F\$PCHK)	
Word 15	(F\$RDW)	
Word 16	(F\$PTH)	
Word 37	(F\$CUSW)	
Word 40	(O\$NAME)	1,,200
Word 240	(O\$FILE)	2,,200
Word 241	(A\$FHLN)	LN\$AFH (32)
Word 242	(A\$FLGS)	not used
Word 243	(A\$WRIT)	.FBWRT of FDB
Word 244	(A\$ALLS)	ICOLEN
Word 245	(A\$MODE)	.DMIMG
Word 246	(A\$LENG)	.FBSIZ of FDB
Word 247	(A\$BSIZ)	
Word 250	(A\$VERS)	

The O\$NAME and O\$FILE blocks always appear in the same place in the same order. Dumper hardwires the lengths and the offsets of these blocks and lets monitor calls like SOUT terminate on the null at the end of the string.

5.2.4 Interchange File Trailer (record type 3)

The standard Dumper File Trailer has no counterpart in Backup. The end of file in Interchange mode is determined by the GF\$EOF flag in the G\$FLAG word of a T\$FIL record.

5.2.5 Interchange Tape Trailer (record type 4)

The tape trailer for Dumper Interchange contains the saveset name. This generates a T\$END record.

Word	Name	Contents
Word 0	(G\$TYPE)	Record Type
Word 1	(G\$SEQ)	Record sequence Number
Word 2	(G\$RTNM)	Relative Tape Number
Word 3	(G\$FLAG)	GF\$NCH
Word 4	(G\$CHK)	Checksum (ignored)
Word 5	(G\$SIZ)	
Word 6	(G\$LND)	Length of Saveset Name
Word 13	(G\$CUSW)	Customer Word
Word 14	(S\$DATE)	Universal Date and Time
Word 15	(S\$FMT)	BKFMT (1)
Word 16	(S\$BVER)	expected but not provided
Word 17	(S\$MON)	expected but not provided
Word 20	(S\$SVER)	expected but not provided
Word 21	(S\$APR)	expected but not provided
Word 22	(S\$DEV)	
Word 23	(S\$MTCH)	
Word 24	(S\$RLNM)	
Word 25	(S\$LBLT)	
Word 37	(S\$CUSW)	
Word 40	(O\$SSNM)	5,,word count of saveset name
Word 41		Saveset name, ASCIIZ string

5.2.6 Interchange User Information (record type 5)

This record is not written because it contains system dependent information.

5.2.7 Interchange Continuation Header (record type 6)

This record is written on an Interchange tape. It is analagous to a T\$CON record in Backup.

Word	Name	Contents
Word 0	(G\$TYPE)	Record Type
Word 1	(G\$SEQ)	Record sequence Number
Word 2	(G\$RTNM)	Relative Tape Number
Word 3	(G\$FLAG)	GF\$NCH
Word 4	(G\$CHK)	Checksum (ignored)
Word 5	(G\$SIZ)	
Word 6	(G\$LND)	Length of Saveset Name
Word 13	(G\$CUSW)	Customer Word
Word 14	(F\$PCHK)	
Word 15	(F\$RDW)	Relative Block Number
Word 16	(F\$PTH)	
Word 37	(F\$CUSW)	Customer Word
Word 40	(O\$SSNM)	5,,words in saveset name
Word 41		Saveset name, ASCII strings

5.2.8 Interchange Filler (record type 7)

This record type has no counterpart in Interchange mode.