

NASA CR-177,993

NASA CR-177993

NASA-CR-177993
19860007444

Magnetic Tape User Guide

September 1985

**Central Scientific
Computing Complex**

Document A-3

NASA

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23665



NF01018

MAGNETIC TAPE
USER GUIDE

Prepared by

A. B. Evans
and
L. L. Lee

System Development Corporation

Hampton, Virginia

September 1985

LIBRARY COPY

JAN 22 1986

LANGLEY RESEARCH CENTER
LIBRARY, NASA
HAMPTON, VIRGINIA

This User Guide provides a general introduction to the structure, use, and handling of magnetic tapes at LaRC. The topics covered are tape terminology, physical characteristics, error prevention and detection, and creating, using, and maintaining tapes. Supplementary documentation is referenced where it might be helpful. Any questions or comments concerning this guide should be directed to the User Consultation Office, extension 3548.

N86-16 914 #

This Page Intentionally Left Blank

MAGNETIC TAPE USER GUIDE

SEPTEMBER 1985

<u>CHAPTER</u>	<u>TITLE</u>	<u>PAGE</u>
1.	GLOSSARY OF COMMON TAPE TERMINOLOGY	1
2.	PHYSICAL AND RECORDING CHARACTERISTICS OF MAGNETIC TAPE	4
3.	MAGNETIC TAPE ERRORS	7
4.	MAGNETIC TAPE CAPACITIES	11
5.	CREATING AND USING LaRC/NOS INTERNAL TAPES	14
6.	INTERCHANGING TAPES WITH OTHER INSTALLATIONS	19
7.	INTERCHANGING TAPES WITH OTHER LaRC COMPUTERS	22
8.	GENERAL QUESTIONS ON HANDLING EXTERNAL TAPES	26
9.	ICOPS TO NOS TAPE CONVERSION	29
10.	USER VALIDATION FOR NOS TAPE USAGE	30
11.	UTILITIES FOR CREATING AND READING TAPES ON NOS	31
12.	PROGRAM BLOCK	36
13.	PROGRAM UNBLOCK	40
14.	PROGRAM TAPEDMP	45
	REFERENCE LIST	50
	INDEX	51

1. GLOSSARY OF COMMON TAPE TERMINOLOGY

One of the problems when discussing magnetic tapes is that many users are not familiar with standard tape terminology. The following list of common terms should help bridge that information gap:

Seven-Track Tape - Six data bits plus one parity bit are recorded across the tape (one frame).

Nine-Track Tape - Eight data bits plus one parity bit are recorded across the tape (one frame).

Tape Density - The number of frames of information recorded lengthwise per inch along the tape. An 800 bpi (bits per inch) seven-track tape may contain up to 800 BCD characters within each recorded inch, because one 6-bit character is recorded on each frame and there are 800 frames per inch. The permitted densities for seven-track tapes are 200, 556, and 800 bpi. Nine-track tape density is referred to as cpi (ASCII or EBCDIC characters per inch). The permitted densities for nine-track tapes are 800, 1600, and 6250 cpi.

Tape Drive - Hardware used to read and write seven- or nine-track magnetic tape (but not both). A tape drive may support more than one recording density. The hardware to support all densities is not available on every NOS machine in the computing complex. At least one nine-track drive is available to each NOS machine; only one seven-track drive exists in the NOS environment. Consult the tape librarian (ext. 2438) for information on hardware availability. LIDs (logical ids) MT7 and GE9 are defined to direct jobs to a NOS computer with seven-track (556 and 800 bpi) and nine-track (6250 cpi) drives, respectively.

Odd Parity - The total number of bits (including parity bit) set to one in each frame of the tape is an odd number (1, 3, 5, 7,9). During recording, if the total number of data bits in a frame is even, the parity bit is set to one to force an odd parity condition. Odd parity may exist on seven- or nine-track tapes. On NOS, it is the only parity used for nine-track tapes.

Even Parity - The total number of bits (including parity bit) set to one in each frame of the tape is an even number (2, 4, 6, 8). During recording, if the total number of data bits in a frame is odd, the parity bit is set to one to force an even parity condition. Even parity may exist on both seven- and nine-track tapes. However, nine-track tapes with even parity cannot be processed on NOS.

Format - The tape recording format selected by the user (or by default) to describe the physical file structure of a tape. On NOS, the default format is Internal (F=I), and is suitable only for NOS to NOS data transfer. The best formats for tape interchange between unlike computers are Stranger (F=S) and Long Block Stranger (F=L).

Logical Record - A group of characters or words that could be passed as a unit to a user program (e.g., a card image record or a record created by a FORTRAN unformatted write). The logical record structures (record types) supported on NOS are defined by CYBER Record Manager. See document N-19 or N2-19.

Physical Record Unit (PRU) - A data unit transmitted by the system to or from a storage device. The PRU size is governed by the device type. For magnetic tapes, a PRU is one block.

Block - A group of contiguous frames on a tape, followed by an interblock gap. Each block is equivalent to one physical record unit (PRU), and may contain one or more logical records. If there is one logical record per PRU, the tape is referred to as unblocked. The block size is measured in characters.

Interrecord gap - An empty space occurring between data blocks. The length of the gap is .75 inch on seven-track tapes, .60 inch on 800 and 1600 density nine-track tapes, and .30 inch on 6250 density nine-track tapes. An interrecord gap is also called an interblock gap.

Recording Mode - NOS records data on tapes in two different modes, binary and coded. On seven-track tapes this usually involves two separate parities; odd parity for binary data and even parity for coded data. On nine-track tapes, both data types are recorded in odd parity by NOS. On a seven-track and nine-track binary tape the data is stored as it appears in central memory (e.g., display code characters); on a seven-track coded tape each character is converted from its display code representation to a machine-independent 6-bit code called external BCD (Binary Coded Decimal); on a nine-track coded tape each character is converted from its display code representation to a machine-independent 8-bit code (ASCII or EBCDIC). It is best to use coded mode if a tape is being sent to a non-CDC site. Binary mode may be used to record anything; coded tapes may only be used to record character data (program source, data card images, formatted output).

Volume - A reel of magnetic tape.

ACD Tape Library - A set of magnetic tapes that are provided by ACD for the user community. Library tapes are assigned to users by user number (username) and can be used on any computer in the Central Scientific Computing Complex, but may not be removed from the Complex.

External Reel - Any volume that does not belong to ACD.

Volume Serial Number (VSN) - A number assigned to a reel of tape. The tape librarian assigns a unique volume serial number to each ACD library tape. The user assigns a VSN to each external reel requested from the tape librarian or submitted to the library.

ANSI Tape Labels - Eighty-character blocks written by the operating system at the beginning and end of information, the end of a reel, and at the beginning and end of a file or group of files. The labels are written in the character set corresponding to the recording mode of the tape. (Refer to section 2 of document N-2 or N2-2.) ACD library tapes

are labeled with ANSI standard labels which contain the tape's external VSN. This pre-labeling (or blank labeling) prevents the computer operator from mounting the wrong tape. The tape owner can include other information in the ANSI tape label if desired. Tape labels that do not conform to ANSI standards in format or content are defined as non-standard labels.

Unlabeled Tape - A tape containing only data.

Cleaning - The tape is mechanically scraped and wiped to remove dirt and oxide buildup, optically scanned for damage, and precisely rewound. Existing data is not damaged.

Erasing (degaussing) - The magnetic polarity induced when the tape was written is neutralized. Existing data is destroyed.

Certification (evaluation) - The tape is cleaned and erased, overwritten with a test pattern that is read back and verified, and erased again. Existing data is destroyed.

Instrumentation Field Tape - Magnetic tape normally used to store analog (continuous) voltage measurements from instruments under test conditions. Instrumentation tape can be played back at the Central Data Transcription Facility where the analog data is sampled at a specified rate, converted to digital (discrete) values, and written to computer-compatible digital tape. For more information about analog-to-digital conversions, data transcription, or use of analog tape at LaRC, contact the Data Management Section of ACD, ext. 3898.

2. PHYSICAL AND RECORDING CHARACTERISTICS OF MAGNETIC TAPE

2.1 Physical Characteristics

Magnetic tape is constructed by coating a thin ribbon of plastic with iron particles that can be magnetized. The materials used are:

Base Material or Backing - The base material is the body of the magnetic tape. The most common type of backing for computer tape is Mylar, a polyethylene material.

Oxide - A layer of oxide particles is applied to the base film. This ferro-magnetic material is spread uniformly on the recording surface of the tape.

Binder - The material used in the manufacturing process to bond the oxide particles to the base material.

2.2 Recording Characteristics

2.2.1 Methods of Recording.

The fundamental method of magnetic recording involves the magnetization of minute areas of the surface of a highly retentive magnetic material. In order to reproduce the recorded information, the magnetic state of the material is read back by using the retained or residual magnetic flux to induce a signal in the read circuits. Magnetic surface recording is based on the electro-magnetic interaction between a material (magnetic tape) as it passes a magnetic head (read/write head of the tape drive).

The interaction between each magnetic area of tape and the write head produces a change in the magnetic flux which is usually transcribed as a single bit. A collection of these bits on tape actually represents the written data. The bits are recorded in a series of tracks. Seven-track tapes have six data tracks and one parity track (see figure 2-1); nine-track tapes have eight data tracks and one parity track (see figure 2-2).

Since the entire width of the $\frac{1}{2}$ inch tape is coated with magnetic oxide, the same tape may be used for either seven-track or nine-track recording.

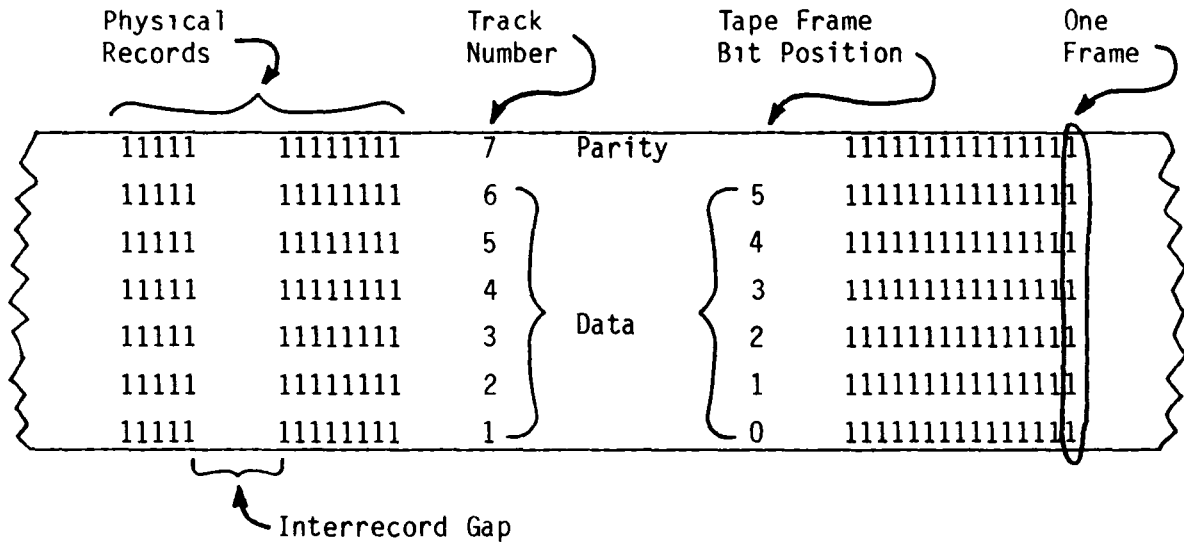


Figure 2-1. Seven Track Recording Structure.

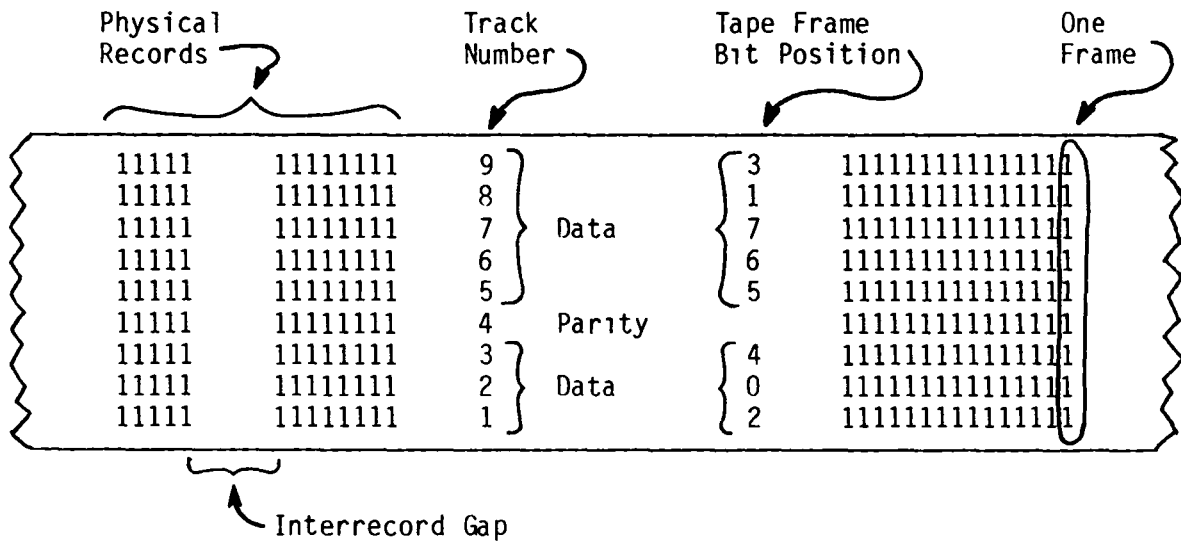


Figure 2-2. Nine Track Recording Structure.

2.2.2 Physical Recording Modes.

There are three schemes used in recording information on magnetic tape: Non-Return-To-Zero (NRZI), Phase Encoding Modulation (PE), and Group Coded Recording (GCR) modes.

In the NRZI mode of recording, only the "1" bits are actually written to the tape. That is, when a "1" needs to be written on the tape, there is a change in the current which causes a flux change on the tape. When a "0" is encountered there is no change in the current and nothing is written on the tape. The advantage of NRZI is that recording is more

compact because the variation in the flux is reduced. The disadvantage is that there is not a specific magnetic mark on the tape for each bit, making data recovery less reliable. NRZI recording is used on both seven-track and nine-track tapes.

The PE Modulation mode records both the "1" and "0" bits on tape by changing the direction of the current through the write head. PE recording is used only on nine-track tapes written at 1600 cpi.

Group Coded Recording is a method by which the tape controller creates blocks consisting of subgroups of data plus padding, check, and residual characters as needed. Each subgroup within a block contains seven characters of data and one error-correction character. Completed blocks are written to the tape in NRZI mode. The GCR method is only used on 6250 cpi tapes.

2.2.3 Data Representation.

Binary Data

For both seven-track and nine-track tapes, binary data is taken as it resides in the computer memory and is written directly to magnetic tape. This produces a system-dependent tape.

Coded Data

In the case of coded recording, the character data (represented in computer memory as display code on NOS) is converted before it is written to the magnetic tape. Conversion is dependent on the track specification of the tape.

For seven-track coded tapes, the display code value represented in memory is converted by NOS from display code to an internal BCD value. The internal BCD value is then converted by the controller hardware of the tape drive to an external BCD value and written on tape. In reading the tape, the process would be reversed. This method produces a system-independent magnetic tape recorded in external BCD.

For nine-track coded tapes, the display code value represented in memory is converted by NOS to the designated code, which is then written to the magnetic tape. This method produces a system-independent magnetic tape recorded in one of two codes, ASCII or EBCDIC. The code is specified by the user or by installation default (ASCII on NOS).

3. MAGNETIC TAPE ERRORS

In the preceding section the physical and recording characteristics of magnetic tapes were discussed in general. Another important aspect of magnetic tapes, often associated with the physical tape itself, is the variety of errors that may occur when using the tape. The system attempts to diagnose these errors and issue appropriate dayfile messages.

3.1 Common Tape Errors

Dropout Errors result when the strength (amplitude) of the read signal is less than the threshold level (clipping level voltage) that is set into the tape drive. Most dropout errors occur because of tape contamination; about 90% of these are defects caused by oxide build-up. Oxide rubs off the tape and is later redeposited. This causes the tape to separate from the tape drive read head, decreasing the read signal strength. Tape certification usually detects dropout errors.

Noise Errors result when the strength of the read signal is greater than the threshold level (clipping level) of the tape drive at a time when no signal should be present (as in an interblock gap). Most noise errors are due to a lack of oxide.

Skew Errors are caused by misalignment of the tape on the tape drive. If the tape is curved, it will not move past the read head in a straight line. This will cause one of the outside tracks to either lead or lag the other tracks.

Level Errors are amplitude errors, the result of variations in the thickness of the oxide coating. This can be caused by the manufacturing process or heavy use.

3.2 Reducing Tape Errors

The most common errors are signal dropouts caused by oxide particles loosened during normal wear. These may be easily cleaned from the tape when they first occur; repeated use of a tape will allow these error-causing particles to adhere firmly and finally become embedded in the surface of the tape.

To aid in reducing tape error conditions, procedures have been developed to ensure that the ACD library internal tapes are cleaned on a regular basis. The date of the last cleaning is indicated on the tape user list, distributed regularly to each ACD library tape user.

To ensure optimal recovery of data, procedures have been developed to inform the user via the user tape report when a tape should be certified. Certification, which destroys the information on the tape, cannot be done while the tape is assigned to the user. If data needs to be kept for an indefinite period of time, arrangements should be made to exercise the tape every six months.

Certification is highly recommended for any external tape about to be written. Time is better spent on tape evaluation (certification) than on attempts to salvage data.

A request for cleaning, erasing, and certification must be made in writing (or) by completing the form shown in figure 3-1. Copies of the External Reel Maintenance/Release Request form are available from the Tape Librarian and the Operations Control Office.

EXTERNAL REEL MAINTENANCE/RELEASE REQUEST

To: Tape Library
B126B⁴, Room 2201
MS 157B

From: _____

MS: _____

Delivery Bldg: _____

Phone: _____

Complete only one section below.

Permanent Release Request

Tape Number(s): _____

_____ This tape(s) is no longer needed and may be permanently released to the Tape Library.

Signed: _____

Date: _____

Tape Maintenance Request

Tape Number(s) _____

Check one:

_____ Erase (removes data only)

_____ Evaluate (removes data, cleans, and checks for physical damage)

Tape Disposition (check one)

_____ Return to user (delivery information indicated above)

_____ Place in library for use on system

Signed: _____

Date: _____

TAPE LIBRARY USE ONLY

Operator _____ Date: _____ Time _____

Figure 3-1. External Reel Maintenance/Release Request Form

The more a tape is used the higher the probability that it may become damaged. Because the quality of all magnetic tapes decreases with age and repeated use, any volume containing data which cannot be easily recreated or obtained from another source should have at least one backup reel from which new working-copy reels can be made.

3.3 Salvaging Data from Damaged Tapes

Cleaning a tape may eliminate removable errors. Some errors cannot be removed by any means. Examples of each type follow:

<u>Removable</u>	<u>Permanent</u>
oxide clump	coating streak
loose oxide	hole in oxide
fibrous or hairlike particles	crater
metallic particle	crease
dirt	damaged edge

Persistent tape errors often lead to permanent loss of data.

Assistance in analyzing problem tapes is provided by the tape analysis group. The facility used by the tape analysts can locate unusable portions of a tape and identify physical damage; a new tape can be created from the unaffected footage but the resulting tape may lack the logical continuity of the original information. Sometimes data from the damaged areas can be reconstructed.

3.4 NOS Error Detection and Handling

The NOS tape handling software and hardware was designed to make error-free copies of data files. During a write operation, the read-heads read the tape as the write-heads write each block. If the data is not correct, up to five more attempts are made to write the block correctly. If all attempts fail, a six-inch erase block is written over the bad block and the write operation is retried at the new tape position. A fatal error (ERASE LIMIT) occurs after 20 consecutive erasures. During a read operation, frame (and, if appropriate, longitudinal) parity checks are performed on each block. Up to 20 attempts can be made to read a single block. Error detection is reported in the user's job dayfile. Sometimes parity errors can be corrected "ON THE FLY" by the tape software making re-reading the block unnecessary.

If a NOS job dayfile becomes cluttered with multi-line tape error messages, including ones of the form:

```
{ MT }
{ NT }, Ccc, Eec, Hhhhhhhh, RECOVERED
```

, then the quality of the physical tape and/or the logical data has become degraded. It is advisable to create a new working tape from the backup. If there is no backup tape, create one immediately.

If the errors are recovered by the system, the meaning of each specific field of the MT/NT messages is not critical. However, some fields of these error messages point to correctable problems. The system dayfiles are monitored by the tape analysis group for this purpose.

For the significance of these diagnostic messages, refer to appendix B of document N-2 or N2-2.

4. MAGNETIC TAPE CAPACITIES

The three general formulas for computing approximate tape capacity are:

$$\text{INCHES PER PRU} = \frac{\text{CHARACTERS PER PRU}}{\text{DENSITY}} + \text{GAP}$$

$$\text{PRUs PER TAPE} = \frac{\text{INCHES PER TAPE}}{\text{INCHES PER PRU}}$$

$$\text{CHARACTERS PER TAPE} = \text{CHARACTERS PER PRU} * \text{PRUs PER TAPE}$$

where:

- GAP = .75 for seven-track tapes
- .60 for nine-track tapes (800, 1600 cpi)
- .30 for nine-track tapes (6250 cpi)

Reel Diameter in Inches	6	7, 7 1/2	8 1/2	10 1/2
Maximum Tape Footage	200	600	1200	2400

Example 1:

Suppose a large reel (approximately 2200 feet) of magnetic tape is created on NOS by the BLOCK program (section 13) as a nine-track, S-format tape at a density of 800 cpi using a blocksize of 5120 by specifying 80 characters per record (RL=80) and 64 records per block (RB=64). ASCII character conversion will be performed by default.

$$\text{INCHES PER PRU} = \frac{5120}{800} + .60 = 7.0$$

$$\text{PRUs PER TAPE} = \frac{2200 * 12}{7.0} = 3771$$

$$\text{CHARACTERS PER TAPE} = 5120 * 3771 = 19.30 \text{ million}$$

Note

As the number of characters per PRU decreases, the number of PRUs written to the tape increases, which increases the number of interblock gaps and decreases the number of characters per tape.

The LaRC NOS charging formula imposes a tape read/write charge per PRU. It is least expensive to record as much data per PRU as possible.

Example 2:

Now, consider using the same reel at 800 cpi, to store 80-character blocks (1 block = 1 data card image). In this case, the length of each data block is .1 inches ($80/800 = 0.10$), and the tape would be composed mostly of blank space. This tape would have 37,714 PRUs, but only 3.01 million characters (an 84% decrease from the S-format tape in example 1).

Example 3:

Finally, if the 2200-foot, nine-track, S-format tape from example 1 is written at a density of 1600 cpi, then an estimate would be calculated as follows:

$$\text{INCHES PER PRU} = \frac{5120}{1600} + .60 = 3.8$$

$$\text{PRUs PER TAPE} = \frac{2200 * 12}{3.8} = 6947$$

$$\text{CHARACTERS PER TAPE} = 5120 * 6947 = 35.57 \text{ million}$$

Therefore, utilizing a 1600 cpi tape (instead of the 800 cpi tape of example 1) results in an 84% increase in the number of characters written to the tape.

Example 4:

By contrast, if this 10^{1/2} inch reel of tape were written in I-format for use exclusively on NOS, the data would be copied in binary mode in blocks of 5120 six-bit display code characters or 512 60-bit words. Because the character code conversion is not performed, a more refined estimate of the tape capacity maybe computed as follows:

$$\begin{aligned} \frac{512 \text{ words per PRU} * 60 \text{ bits per word}}{1600 \text{ frames per inch} * 8 \text{ bits per frame}} + .6 &= 2.4 + .6 \\ &= 3.0 \text{ inches per PRU} \end{aligned}$$

Then

$$\begin{aligned} \frac{2200 \text{ feet} * 12 \text{ inches per foot}}{3 \text{ inches per PRU}} &= \frac{26400}{3.0} \\ &= 8800 \text{ PRUs per tape} \end{aligned}$$

And

$$5120 * 8800 = 45.056 \text{ million display code characters per tape.}$$

Warning

The following figures are only approximations. Additional tape is required by the recovery process if write operation parity errors occur. Also, a 2400-foot tape may have been shortened during certification. An ACD library tape may become as short as 1800 feet.

Capacities of a 2400-Foot Tape in Stranger Format as a Function of Density and Block Size						
Block Size PRU Size (In Characters)	Characters (In Millions)			Blocks or PRUs (In Thousands)		
	6250 cp1 nine track	1600 cp1 nine track	800 bp1 seven track	6250 cp1 nine track	1600 cp1 nine track	800 bp1 seven track
80	7.60	3.54	2.71	95.11	44.31	33.88
136	12.17	5.72	4.26	89.51	42.04	31.30
800	53.83	20.95	13.17	67.29	26.18	16.46
1280	73.02	26.33	15.69	57.05	20.57	12.26
5120	131.75	38.80	20.62	25.73	7.58	4.03

5. CREATING AND USING LaRC/NOS INTERNAL TAPES

It is sometimes necessary to maintain files on magnetic tapes due to a necessity for increased security, program design restrictions, or the large volume of information to be stored. Since the main advantage of magnetic tapes is their immense storage capacity, the user should insure that more than a fraction of the tape is utilized. An efficient method for storing both related and unrelated groups of stable (infrequently modified) information on a tape is the use of multifile sets. Descriptive information placed in the tape labels during creation allows the tape to be virtually self-documenting.

Warning

All ACD library tapes (VSNs NAxxxx through NZxxxx) are ANSI-labeled tapes. Attempts to create a library tape without a label will fail.

5.1 Constructing the LABEL control statement

NOS provides several different formats for reading or writing magnetic tapes. Each tape format has specific characteristics regarding block size, recording mode, presence of tape labels, etc. Most of the tape formats are relevant only when reading tapes created at non-NOS installations or when creating tapes to be read at such installations.

The default tape format used on NOS is Internal (I). I-format tapes are written in binary recording mode with a maximum block size of 5120 characters at a density of 1600 cpi; they can be either labeled or unlabeled. I-format tapes are very reliable and have excellent error recovery capabilities, but they are unique to NOS and can be used only for data interchange with other NOS sites.

When a tape is mounted, the default LaRC Computer Complex specifications will be applied, unless overridden by other control statement parameters. Some default specifications are: ANSI Standard labels (containing the tape VSN), density of 1600 cpi, nine-track tape. Should the need arise for a nine-track unlabeled, seven-track labeled, or a seven-track unlabeled tape, an external reel must be used. Careful reading of the LABEL statement documentation in section 10 of document N-2 (section 12 of document N2-2) is recommended.

A NOS tape is created and later accessed with a LABEL control statement. For most tape users at LaRC, the following simplified version of the LABEL statement will suffice:

$$\text{LABEL}(\text{lfn}, \text{PO}=\left\{\begin{matrix} \text{W} \\ \text{R} \end{matrix}\right\}, \text{VSN}=\text{vsn}, \left\{\begin{matrix} \text{W} \\ \text{R} \end{matrix}\right\}, \text{QN}=\text{nnnn}, \text{SI}=\text{setid}, \text{FI}=\text{fileid})$$

where:

- lfn is the local file name of the magnetic tape in this run.
- PO= is the processing option for this run;
PO=W allows the tape to be Written or read;
PO=R permits the tape only to be Read.
- VSN= is the Volume Serial Number (e.g., VSN=NZ1234).
- W causes labels to be written (creation only); W must not be used at any other time as existing data is destroyed.
- R causes labels to be read and verified.
- QN= causes the multifile set tape to be positioned to the specified file sequence number (must be equal to 9999 to extend a file set).
- SI= specifies the set identifier to be read from or written to the tape label; only one SI is allowed per volume of tape.
- FI= specifies the descriptive file identifier to be read from or written to the tape label.

For further description of these and other parameters, refer to the documentation of the LABEL control statement: Document N-2 or N2-2.

5.2 Advantages of Multifile Set Tapes

Multifile set tapes provide the capability to group both related and unrelated files of stable information on a tape in a uniquely identifiable manner.

Maintaining the maximum possible information on a tape not only increases job efficiency by decreasing the number of tape mounts required, it also decreases the possibility of error in tape specification, since the user will have fewer VSNs to remember.

A further advantage in the use of multifile set tapes is their self-cataloging capability when the set identifier (SI) and file identifier (FI) fields are specified at creation time. These labels may be easily listed with the LISTLB control statement (Document N-2).

Increased file security may be obtained by specification of the file accessibility (FA) parameter on tape creation. Access may be restricted to the tape owner. Setting an FA also provides a safeguard against the tape being overwritten if accidentally requested by another user job.

NOTE

Multifile tapes should only be used for stable files that do not need to be changed or updated frequently.

Example 1:

To create a file on an internal tape with the information from a permanent file named FILEA, call the tape librarian (ext. 2438) for assignment of a reel (e.g., NZ1234 or NA5678) and use the following control statements:

```

jobname,...                ...delivery...
USER,...
CHARGE,...
LABEL(TAPE1,PO=W,W,VSN=NZ1234)
GET,FILEA.
COPY,FILEA,TAPE1.
RETURN,TAPE1.

```

The reel number of the tape that is assigned to the job (volume NZ1234 in this example) is listed in the job's dayfile and will appear in the user's next tape list. A subsequent run that reads the tape created above might use the following control statement to mount the tape (note that the local file name assigned to the tape can change from run to run):

```
LABEL(TAPE13,PO=R,VSN=NZ1234,R)
```

NOTE

When possible, it is recommended to copy the tape to a disk file for processing due to the limited number of tape drives on each machine. Be considerate of other users; return the tape as soon as it is no longer required for processing.

Example 2:

If the quantity of data to be written exceeds the capacity of a volume of tape, a continuation reel (or reels) must be specified on the VSN statement. (A data tape should not be created using continuation reels if subsequent read processing will require rewinding the tape.)

This example will create an EBCDIC-labeled, I-format, nine-track tape series. The first reel used will be NB0001. If necessary, NP2000 will then be mounted.

```
VSN(TAPE2=NB0001/NP2000)
LABEL(TAPE2, CV=EB, PO=W, W)
ATTACH, LONGFIL.
COPY, LONGFIL, TAPE2.
RETURN, TAPE2.
```

Subsequent runs to read the tape need only specify the first VSN. Continuation reel identification is contained in the ANSI standard labels. The following control statements might be used to copy the data to disk:

```
DEFINE, NEWLONG.
LABEL(TAPE3, PO=R, CV=EB, VSN=NB0001)
COPY, TAPE3, NEWLONG.
RETURN, TAPE3.
```

NOTE

If continuation reels are used on an unlabeled tape, all reels must be specified in the correct order on the VSN control statement. Since no labels are present, the system has no way of checking that the correct tape was mounted.

Example 3:

To create a multifile set tape containing the three related files DATA1, DATA2, and DATA3, the following control statements could be used:

```
GET, DATA1, DATA2, DATA3.
VSN, TAPE=NFO010.
LABEL, TAPE, PO=W, W, QN=1, SI=SET1, FI=$FLIGHT ONE DATA$.
COPY, DATA1, TAPE.
LABEL, TAPE, PO=W, W, QN=9999, SI=SET1, FI=$FLIGHT TWO DATA$.
COPY, DATA2, TAPE.
LABEL, TAPE, PO=W, W, QN=9999, SI=SET1, FI=$FLIGHT THREE DATA$.
COPY, DATA3, TAPE.
```

To read data file two from the tape at a later date, either of the following control statements could be used to properly position the tape:

```
LABEL, TAPE1, VSN=NFO010, PO=R, R, QN=2, SI=SET1.
or
LABEL, TAPE1, VSN=NFO010, PO=R, R, SI=SET1, FI=$FLIGHT TWO DATA$.
```

Example 4:

The BLOCK program (see section 12) may be used to create a tape similar to example 3. In this case, the file identifier (FI) will be the file name copied to the tape. The control statements would be:

```
NOTE,FLIST./DATA1/DATA2/DATA3
GET,BLOCK/UN=LIBRARY.
VSN,TAPE=NFO010.
BLOCK,SET1,F=I,M=BINARY,I=FLIST,LB.
```

The UNBLOCK program (see section 13) may be used to position and read a file from a multifile set tape, but positioning may only be through the QN and SI parameters. FI is not a valid program parameter. The control statements to retrieve DATA2 and DATA3 from NFO010 as local files DD and DDD, respectively, would be:

```
GET,UNBLOCK/UN=LIBRARY.
VSN,TAPE=NFO010.
UNBLOCK,DD,LB,SI=SET1,QN=2,F=I,M=BINARY.
VSN,TAPE=NFO010.
UNBLOCK,DDD,LB,SI=SET1,QN=3,F=I,M=BINARY.
```

Example 5:

A listing of all of the labels of the above multifile set may be obtained by:

```
LABEL,TAPE,PO=R,QN=1,SI=SET1,VSN=NFO010.
LISTLB,TAPE,SI=SET1,LO=A.
```

5.3 Special Handling for Critical Information

The ACD tape library provides limited tape storage for data that is judged to be critical. Critical-hold tapes are stored in a locked safe located in the tape library vault. Normal access to critical-hold tapes is prohibited by operational procedures. Once a volume is secured, special arrangements must be made to allow read operations; Write operations are strictly disallowed. "Critical Tape Request" forms are available from the tape librarian to apply for critical-hold status.

6. INTERCHANGING TAPES WITH OTHER INSTALLATIONS

6.1 General Guidelines for Non-LaRC Tapes

When interchanging tapes with other CDC/NOS installations, it is best to use internal (F=I) format, labeled tapes. This is the LaRC NOS default.

When interchanging tapes with CDC installations that use the SCOPE Operating System, it is best to use system internal (F=SI) unlabeled tapes (SCOPE 3.4 users call the NOS SI format an I format).

When interchanging tapes with non-CDC installations, use unlabeled stranger (F=S) tapes.

In all three of the above situations, a nine-track, 1600 density tape should be used if the exchange installation has the supportive hardware. If not, contact the installation for their hardware requirements. It is also advisable to specify all applicable control statement parameters including defaults. It is not recommended to use continuation reels with unlabeled tapes.

6.2 Guidelines for Writing Tapes for Non-CDC Installations

Most installations can easily read an unlabeled, unblocked stranger tape created with the TCOPY utility (Document N-2 or N2-2). If the amount of data is too great to fit on an unblocked tape, records may be blocked through program BLOCK (see section 12) or by a user program and CYBER Record Manager (FORTRAN program and FILE control statement).

Warning

CDC FORTRAN default record types are not readable at non-CDC sites. The data must be reformatted by one of the preceding methods.

6.3 Guidelines for Tapes to be Written at Non-CDC Installations

The purpose of this section is to offer some specifications that should be met by other computer installations when creating a tape.

The following list specifies formats that can be read at LaRC on NOS.

Optimum Specifications

- a. 1/2 inch magnetic tape written as (in order of preference):
 - (1) nine-track, 1600 cpi density, odd parity, ASCII or EBCDIC.
 - (2) nine-track, 6250 cpi density, odd parity, ASCII or EBCDIC.
 - (3) nine-track, 800 bpi density, odd parity, ASCII or EBCDIC.
 - (4) seven-track, 800 bpi density, even parity, BCD.
 - (5) seven-track, 556 bpi density, even parity, BCD.
- b. Unlabeled.
- c. A logical end-of-file is a hardware tape mark.
- d. No more than 5120 characters per block (physical record).
The logical records should be fixed length and unblocked
(i.e., only one logical record or one card image or line image
per block).

6.4 Reading an Ill-Defined Tape

When a magnetic tape is received that was not written to the previous optimum specifications, answer the following questions before trying to read the tape. If no supporting documentation accompanied the tape, contact the installation from which it was obtained.

- a. What computer wrote the tape?
- b. If the tape was written on a CDC computer, with what format was it written (e.g., SI, I, etc.)?
- c. Is it a seven- or nine-track tape?
- d. What is the recording density?
- e. Does it have even or odd parity?
- f. Is the tape labeled?
- g. If nine-track, ASCII or EBCDIC?
- h. What is the block size (in characters) of the tape data?
(Program TAPEDMP may provide this information. See section 14.)
- i. What is the data supposed to look like?
 - How many files?
 - How long is each file?
 - Source code, data, or upper/lower case text?

Once these basic questions have been answered, the effort to read the tape can begin. A great deal of documentation describing the tape formats available under NOS may be found in document N-2 or N2-2. Information about the record type and file structure of NOS Internal (F=I) and SCOPE Internal (F=SI) tapes can be obtained by using the library maintenance commands CATALOG and ITEMIZE (Document N-2 or N2-2). For documentation describing block and record specifications, refer to the CYBER Record Manager Basic Access Methods Reference Manual and/or User's Guide (Documents N-19 and N-20, respectively). Depending on the logical structure of the data, various utilities are available to retrieve the information. These include the COPY utilities (Document N-2 or N2-2), COPY8P (8-Bit Subroutine Reference Manual: Document N-34 or N2-34), FORM (FORM Reference Manual: Document N-33 or N2-33) and UNBLOCK (described in section 13).

7. INTERCHANGING TAPES WITH SOME OTHER LaRC COMPUTERS

The following sections provide some guidelines and describe the compromises for creating tapes for interchange between the CDC NOS computers at the Central Scientific Computing Complex and other computers that exist at the Complex or throughout NASA/LaRC. These guidelines should alleviate tape reading problems at either end of the exchange.

7.1 CDC VPS-32

Standard VSOS provides two means of accessing tape data:

- (1) A tape can be processed on the front-end NOS computer and its data copied to (or from) a VPS 32 mass storage file via RHF.
- (2) A tape can be processed on the VPS-32 by the Advanced Tape System. ATS can provide alternative file storage and can support the job restart capability. A VPS user job requiring a tape unit must first reserve it by specifying the NT parameter on the RESOURCE statement. ACD library tapes may be used.

Tapes created for interchange with the VPS-32 system must be:

nine-track (6250 or 1600 cpi)
ANSI labeled or unlabelled
coded or binary

Be aware that the differences in word size between computers can present serious conversion problems. For more information, refer to document S-5 or call ext. 4612.

WARNING

A front-end machine for a CDC CYBER 200 series system at another site may not be a CDC-NOS computer.

7.2 DEC PDP-11/70

Tapes created for interchange with the PDP system may be:

ANSI labeled or unlabeled
seven-track (~~556~~, 800 bpi) or nine-track (1600 cpi)

and should be:

blocked or unblocked fixed-length records
ASCII coded data

Note:

The PDP-11/70 can process an even parity nine-track tape. Nine-track tapes must have odd parity to be used on NOS.

7.3 DEC VAX-11/780 and VAX-11/750

Tapes created for interchange with the LaRC VAX computers should be:

- unlabeled
- 1600 cpi
- ASCII coded data
- nine-track (odd parity)

Some of the VAXes can handle other formats (e.g., ANSI labels, 800 cpi, EBCDIC code). To deviate from the above specifications, check with the administrator of the VAX system to be used before writing the tape.

The records should be fixed-length. The record size should be in the range of 20 to 5120 characters. Blocksize should be in the range of 20 to 5120 characters. A blocked file is preferable. VAX/VMS default blocksize is 2048 characters.

Utilities to convert some VAX "stream format" tapes are available via the Information Tree (Document A4).

7.4 HEWLETT-PACKARD

Tapes created for interchange with the variety of HP systems should be:

- unlabeled
- nine-track (odd parity)
- 1600 cpi or 800 bpi

Typically, coded data is processed on an HP as blocked fixed-length records. Any block not completely filled by data records is filled with null characters. Reading these blocks on NOS may cause some problems for CYBER Record Manager which may be circumvented by using only unblocked records.

Some HP and NOS software tools have been created at LaRC for processing and transmitting several kinds of binary data tapes. Refer to the "Applications Software" and "Utilities" categories of the Information Tree (Document A4).

7.5 IBM

Tapes created for interchange with the LaRC IBM site should be:

- labeled
- nine-track (odd parity)
- 6250 cpi
- EBCDIC coded data
- fixed-length records
- blocked records
- [maximum block size of 32760 bytes (characters)]

The following variants may also be accommodated:

- 1600 cpi
- ASCII coded data
- maximum block size 2048 bytes (characters)

Note:

FORM, a CDC product, is available on NOS to perform conversions between IBM 360/370 tapes and CDC internal format files. Conversions include binary and packed decimal data, variable blocked (VB), variable spanned (VS), and variable spanned blocked (VSB) formats. FORM conversions to and from these IBM formats can be costly. (For usage, refer to FORM Version 1 Reference Manual: Document N-34 or N2-34).

7.6 MODCOMP

Tapes used for interchange with a MODCOMP/MAXNET system should be:

- unlabeled (ANSI labels may be skipped but not processed)
- ASCII coded data
- nine-track (odd parity)
- 800 or 1600 cpi
- unblocked card images (one 80-character record per block)

The MODCOMP can process blocks up to 32768 characters long. This is much larger than the maximum blocksize allowed on a CDC stranger (S) format tape (i.e., 5120) or the ANSI-recommended maximum block size of 2048 characters.

7.7 PRIME

A tape created for interchange between PRIME/PRIMOS and CDC/NOS should be:

- unlabeled, 1600 cpi
- ASCII
- 80 or 100 characters per record
- fixed-length records
- unblocked records or 20 records per block for a maximum blocksize of 1600 characters

A conversion aid is available to process or create PRIME tapes on NOS. Refer to the Information Tree (Document A4).

Notes:

PRIME uses marked parity - the upper bit (bit 8) in an ASCII character is always set to one. This renders files unusable on other machines unless this bit is unset. A utility to do this exists on LaRC PRIME systems. Contact PRIME Operations (ext. 2479).

Tapes created on PRIMOS Revision 12 or earlier cannot be processed by the current version of PRIMOS. These tapes use marked parity and cannot be processed by NOS copy utilities either.

8. GENERAL QUESTIONS ON HANDLING EXTERNAL TAPES

What to Do With an External Tape You Receive?

1. Obtain an external label from the tape librarian or OCO prior to job submittal.
2. Assign a VSN (see 'Guidelines' on a following page) and delivery information.
1. Answer the tape questions in section 6.4.
2. Review options available on the LABEL statement and set up the job according to parameters needed.

Where is the Tape Library?

A tape library is located on the second floor of Building 1268B, Room 2201, extension 2438.

How Does a Tape Get Into and Out of the Library?

The tape can be entered into the tape library in one of the following ways:

- a. Hand carried to the tape librarian. (fastest)
- b. Submitted through I/O job submittal window.
- c. Submitted through the green tub delivery system.
- d. Mailed directly to the tape library at MS 157B, RM 2201. (slowest)

Each external tape is cleaned before being placed in the tape library.

After job processing is complete, a call can be placed to the tape librarian at ext. 2438 to retrieve the tape. The tape may be returned in the same manner as it was submitted. If an external tape remains in the library for ten working days, it is automatically returned to the user via the delivery instructions on the tape's external label.

How Should Tapes Be Stored?

- a. If possible, external tapes should be submitted to the tape library 24 hours prior to use. A tape may encounter temperature extremes during shipment. Recovery of data is improved when tapes are allowed to adjust in a controlled environment for 24 hours.
- b. To store an external tape in the tape library for more than ten days, contact the tape librarian at ext. 2438.

How Should a Tape Be Stored Outside of the Tape Library?

- a. Store a tape in a dust-free, temperature- and humidity-controlled environment.
- b. Have the tape cleaned every ten mounts or six months, whichever occurs first. The tape library can provide this service.
- c. If a tape is used often and errors begin to occur, copy it to another tape to ensure continued reliability and recoverability of data. (Assistance is available from the tape library if the user encounters problems in retrieving data.)

What Are Some Guidelines for Choosing a VSN?

- a. Avoid VSNs with two alpha characters followed by four numeric digits, or three alpha characters followed by three numeric digits, since these are the formats used for ACD library tapes.
- b. VSNs should be no longer than six characters.
- c. Recommended VSNs for external tapes are one alpha and five numeric characters, or six alpha characters which are meaningful to the user.
- d. If an external tape is internally labeled with a VSN in one of the inadvisable formats listed in paragraph a, the user should specify a VSN on the external label according to the recommended guidelines, then request the tape in the following manner:

```
VSN(TAPE=ABCDEF=NA0199)  
LABEL(TAPE,NT,D=1600,...)
```

This format allows automatic assignment of an external tape (ABCDEF) containing an internal label similar to a NOS library tape (NA0199). The VSN on the external label (ABCDEF in this example) is displayed to the console operator to allow retrieval from the tape library. The tape drive will check the internal VSN (NA0199).

What Special Processing is Required to Create ANSI-Labeled External Reels on NOS?

- a. To create a single volume as an ANSI-labeled tape, simply access the degaussed tape with a LABEL that includes the PO=W and W parameters and then write the desired data to the tape.
- b. To create a multi-volume set of external reels as labeled continuation tapes, the user must pre-label each continuation reel before the creation process begins.

The following steps are recommended:

1. Select VSNs that are meaningful but not contradictory to the logical ordering (e.g., STUPH1, STUPH2, and STUPH3)

2. Enter all three tapes (new or good quality) into the tape library for NOS processing.
3. Access and label all continuation reels (i.e., STUPH2 and STUPH3).
4. Access the multi-volume set and create the tape files.

Steps 3 and 4 can be combined into one control statement sequence. For example:

```

LABEL,SECOND,PO=W,W,VSN=STUPH2,NT,D=1600,CV=AS.
RETURN,SECOND.
LABEL,THIRD,PO=W,W,VSN=STUPH3,NT,D=1600,CV=AS.
RETURN,THIRD.
VSN(ALL=STUPH1/STUPH2/STUPH3)
LABEL,ALL,PO=W,W,F=S,NT,D=1600,CV=AS.
.
.
(Write data set to ALL)
.
.

```

Warning

The W parameter of LABEL causes labels to be written (or rewritten) on the tape and thereby destroys any existing data. Non-creation tape accesses must not use W.

9. ICOPS TO NOS TAPE CONVERSION

An operating system that preceded NOS at LaRC was called ICOPS. A tape created on that system is probably a seven-track tape written at a density of either 556 bpi or 800 bpi. The following paragraphs describe the various methods used to create ICOPS tapes and how they may now be processed.

1. A tape created on ICOPS by binary writes in a RUN FORTRAN program can be processed by binary reads in a FORTRAN5 program if the following control statements are used:

```
FTN5.  
REQUEST(TAPE1,MT,D=800,F=SI,LB=KU,PO=R) vsn  
FILE(TAPE1,RT=S,BT=C,FO=SQ)  
LGO.
```

2. Standard blocked BCD data tapes created on ICOPS should be converted on NOS before the data can be used. Program COPYICF is available to perform the conversion. Documentation may be located by accessing the Information Tree (Document A-4).
3. ICOPS tapes created with the RUN FORTRAN RECIN/RECOU utilities are not directly compatible with NOS. These tapes can be converted on NOS using the program RIOL. Documentation may be located by accessing the Information Tree.
4. ICOPS tapes created using the BLKIO utility are not directly compatible with NOS. These tapes can be converted on NOS using the program BLKIOL, whose documentation may be located by accessing the Information Tree.
5. Tapes created by the FTNBIN utility on ICOPS are not directly compatible with NOS. These tapes must be converted on NOS using the program FTNCVT for which documentation is available from the Information Tree.

Warning

Because of degeneration due to age, the reliability of the ICOPS tapes currently in the ACD tape library is questionable. The owners of these tapes are urged to convert them to NOS library tapes immediately.

10. USER VALIDATION FOR NOS TAPE USAGE

Normally a user is validated (by user number) to access only one magnetic tape in a job at a time. Output from the LIMITS control statement describes the validation parameters that are in effect for the user. The MT field specifies the number of magnetic tapes the user is allowed to have concurrently assigned to a job (Refer to LIMITS: section 6, document N-2; section 7, document N2-2). If this is not sufficient to perform the required tape processing, a Resource Authorization Request can be submitted to increase the MT value. Such requests are subject to approval by ACD Computer Operations and the responsible Division Computing Manager (DCM).

Using two or more tapes concurrently requires special preparation by the job. To prevent a deadlock situation, NOS must be apprised of the maximum number of allocatable resources job processing demands. A RESOURC control statement which provides this information must appear in the job stream before any of the specified resources are requested.

Examples:

1. To use two 1600 cpi, nine-track tapes concurrently, specify:

RESOURC,PE=2.

2. To use two nine-track tapes concurrently (one each at 1600 and 6250 cpi), specify:

RESOURC,PE=1,GE=1.

Refer to section 6 of document N-2 or to section 7 of document N2-2 for a description of NOS resource management and a list of resource types.

11. UTILITIES FOR CREATING AND READING TAPES ON NOS

Two utilities exist at LaRC to aid the user in both creating and reading magnetic tapes, programs BLOCK (tape creation) and UNBLOCK (data retrieval). They may be used on internal or stranger format tapes. For coded data, both programs produce or require fixed-length records. A table of parameters for BLOCK and UNBLOCK is located at the end of this section. The programs themselves are documented in following sections.

In addition to BLOCK and UNBLOCK, there is a variety of NOS control statements which may be applied to tapes. Unless another reference is specified, all are documented in the NOS reference manuals, Documents N-2 and N2-2.

For internal tapes, the most commonly used control statements to read or write information are COPY, COPYBF, and COPYBR.

For most unblocked stranger tapes, either TCOPI or COPY are adequate. For blocked stranger tapes, programs BLOCK and UNBLOCK are recommended. It is also possible to use a combination of the FILE control statement (CYBER Record Manager Basic Access Methods Version 1.5 User's Guide: Document N-20 or N2-20) a FORTRAN program, and the COPY control statement.

The CDC FORM utility (document N-34 or N2-34) can read and write a wide variety of CDC or IBM internal and external formats.

Text files containing upper- and lower-case characters may be read with the COPY8P control statement (8-Bit Subroutines Reference Manual: Document N-34 or N2-34).

All of the NOS control statements require that the tape be mounted via a LABEL control statement prior to use. Programs BLOCK and UNBLOCK generate the tape request internally.

The following tables describe the parameters for programs BLOCK and UNBLOCK. Table 1 outlines all of the valid arguments and their defaults (if any). The defaults for parameters MT, NT, and D vary. They are contingent on which of the three are specified or omitted. Table 2 provides a description of the interaction and interdependency of these arguments.

Warning

NOS 2.3 provides a BLOCK command which creates block lettered pages to identify output listings. (Refer to Document N2-2.) To use both the LaRC BLOCK program and the BLOCK command in the same job, the NOS BLOCK command must be prefixed with a dollar sign (\$).

Table 1. Parameters for BLOCK and UNBLOCK

<u>KEYWORD</u>	<u>DEFAULT</u>	<u>DESCRIPTION</u>	<u>VALID ON</u>
BS(omitted) BS=bs	5120	Maximum block size in characters. Specifying a BS of greater than 5120 forces F=L. BS is ignored for F=I or SI.	UNBLOCK
CV(omitted) CV CV=cv	ASCII EBCDIC	Character conversion mode for nine-track tapes. Permissible values for CV are AS and EB. CV only applies to the labels on internal format tapes.	BLOCK UNBLOCK
D(omitted) D=den	See Table 2.	Tape density. May be LO HI, HY, HD, PE, GE, 200, 556, 800, 1600, or 6250. (For a seven-track, 800 bpi tape, specify D=HY instead of D=800.)	BLOCK UNBLOCK
EL(omitted) EL EL=e1	0 100	Error limit. Specifies the number of read errors allowed on the tape before aborting the job step.	UNBLOCK
EO(omitted) EO EO=eo	I A	Error option. Specifies action on blocks containing errors. Valid combinations are I, A, P, AP, IP, PA, and PI, where: I - ignore (skip) block A - accept block P - print block	UNBLOCK
F(omitted) F=f	S or L	Tape format. May be S or L for stranger tapes; I or SI for internal tapes. If omitted, the BS parameter determines S or L format (UNBLOCK).	BLOCK UNBLOCK

<u>KEYWORD</u>	<u>DEFAULT</u>	<u>DESCRIPTION</u>	<u>VALID ON</u>
FA(omitted) FA FA=fa	blank blank	File accessibility character. Refer to the NOS Reference Manual: Document N-2.	UNBLOCK
FN FN=fn	SOURCE	File name. Specifies a single file (local or permanent) to be rewound and written to the tape. If omitted, I <u>must</u> be specified. <u>Conflicts</u> with the I parameter.	BLOCK
I I=ifn	INPUT	Local file containing a list of files (local or permanent) to be rewound and written to the tape. Format is one file name per line, beginning in column 1. If omitted, FN <u>must</u> be specified. <u>Conflicts</u> with FN.	BLOCK
L(omitted) L L=lfm	OUTPUT OUTPUT	Local file to receive program report output and informative messages.	BLOCK UNBLOCK
LB(omitted) LB LB=lb	KU KL	Specifies a labeled or unlabeled tape. Values are: KL - labeled KU - unlabeled NS - nonstandard (UNBLOCK only)	BLOCK UNBLOCK
M(omitted) M=m	CODED	Specifies type of copy. Values are: CODED - each text record is blank-filled to the specified fixed record length (RL) by BLOCK; each group of RL characters is converted to a Z-type type (text) record by UNBLOCK.	BLOCK UNBLOCK

<u>KEYWORD</u>	<u>DEFAULT</u>	<u>DESCRIPTION</u>	<u>VALID ON</u>
		<p>BINARY - file is copied to or from tape with no changes to structure or content. Can only be specified with F=I or SI.</p> <p>CODED mode is recommended unless tape is going to a NOS or NOS/BE site.</p>	
MT	See Table 2.	Specifies a seven-track tape.	BLOCK UNBLOCK
NF(omitted) NF=nf	1	Number of files to copy. For a multifile file set tape, this is the number of files to copy from the specified multifile set.	UNBLOCK
NP(omitted) NP	pack nopack	No pack of output file. Default is to remove all internal EORs and EOFs.	UNBLOCK
NT	See Table 2.	Specifies a nine-track tape.	BLOCK UNBLOCK
NS(omitted) NS=ns	18	Noise size. Maximum value is 31 frames. Ignored for I or SI tapes.	UNBLOCK
PO(omitted) PO=po	Copy to EOF	<p>Processing option. Values are:</p> <p>omitted - copy to EOF; if no EOF exists, copy to EOI.</p> <p>X - copy to EOI; write a new block after every EOF.</p> <p>Z - copy to EOI; write a tape mark (EOF) after each internal EOF is encountered. Valid only on unlabeled tapes.</p>	BLOCK

<u>KEYWORD</u>	<u>DEFAULT</u>	<u>DESCRIPTION</u>	<u>VALID ON</u>
QN(omitted) QN=qn	1	File position within multifile set. Applicable only to labeled tapes. (LB parameter required.)	UNBLOCK
RB(omitted) RB RB=rb	5120/r1 5120/r1	Records per block. Specifying RB=1 creates an unblocked tape.	BLOCK
RL(omitted) RL RL=r1	80 136	Record length in characters. Maximum value is 5120. Records shorter than RL will be skipped by UNBLOCK. Records exceeding the specified number of characters are truncated by BLOCK. Minimum value is 24 (BLOCK only).	BLOCK UNBLOCK
SF(omitted) SF=sf	0	Number of files to skip before processing. On a multifile file set tape, this is the number of files to skip within the specified multifile file.	UNBLOCK
SI(omitted) SI SI=s1	blanks blanks	Set identifier. Only valid for labeled, multifile tapes. (For BLOCK, see section 12.)	UNBLOCK

Table 2. Contingent Defaults for MT, NT, and D

<u>MT</u>	<u>NT</u>	<u>D</u>	<u>RESULT</u>
-	-	-	NT,D=1600
MT	-	-	MT,D=556
-	NT	-	NT,D=1600
-	-	200	MT,D=200
-	-	556	MT,D=556
MT	-	HY	MT,D=800
-	-	800	NT,D=800
-	-	1600	NT,D=1600
-	-	6250	NT,D=6250

12. BLOCK PROGRAM

BLOCK is a NOS utility program which will create blocked and unblocked tapes from coded data. BLOCK can be used when TCOPY cannot (i.e., when the TCOPIED file will not fit on one volume). The program may also be used to create binary, internal-format tapes. Usage is as follows:

```

GET,BLOCK/UN=LIBRARY.
BLOCK,vsn,params.           or           GET,BLOCK/UN=LIBRARY.
                                       VSN,TAPE=vsn.
                                       BLOCK,name,params.

```

where:

vsn - volume serial number of the tape
name - optional (unless used for file set identifier; see note 1)

and valid params are:

MT, NT, FN=, I=, D=, LB=, CV=, M=, F=, RL=, RB=, PO=, and L=.

Parameters are order-independent and are described in section 11, Table 1. The contingent defaults for track and density can be found in Table 2 of section 11.

NOTES:

1. Labeled Tape Generation - If LB=KL (NOS standard ANSI label) is selected the tape will be labeled. When BLOCK writes more than one file on a labeled tape, ANSI standard labels are written for each file. The multifile set identifier (SI) will be the vsn or name parameter (the first parameter after BLOCK). If omitted, blanks will be used. The file identifier (FI) will be the name of the file copied to tape.
2. In keeping with the ANSI standard for recording magnetic tape, blocks longer than 2048 characters are not considered suitable for interchange.
3. F and M must both be specified or both omitted. Binary tapes are frequently difficult to process at other sites; therefore, use of binary mode is not recommended (even for sites known to have CDC equipment). If the receiving site is not running NOS or NOS/BE, the default mode and format should be used.
4. PO, RB, and RL parameters are meaningless for M=BINARY.
5. BLOCK cannot be used to extend files on a tape. Each execution overwrites any existing data.
6. BLOCK cannot be used to convert binary files (e.g., MODIFY or UPDATE program libraries) to coded mode. BLOCK aborts on a NOS error condition, such as: BUFFER CONTROL WORD ERROR, lfn AT addr.

EXAMPLES:

1. The following statement copies the file MFC to tape NOSTAP.

```
BLOCK,NOSTAP,NT,D=PE,M=BINARY,F=I,LB,FN=MFC.
```

NOSTAP will be a nine-track tape (NT) with 1600 cpi as the density (D=PE). The tape will have standard labels (LB). The M=BINARY and F=I indicate that the tape is suitable for processing at a NOS site only.

2. The following statement will copy the files listed in the next record on INPUT to tape EXTAPE.

```
BLOCK,EXTAPE,MT,D=HY,RL=136,RB=960,I.
```

The tape will be an external BCD, unlabeled, seven-track tape with density of 800 bpi (MT, D=HY, and no LB parameter). The lines are 136 characters in length (RL=136) and there are 960 lines per block (RB=960). This results in a block length of 130560 characters (too large for some machines to process). The program will select the proper format (L). This tape will have to be unblocked by the receiving site.

3. The following control statements will copy the files ES, COMPILE, CC, DSTAGES, and STAGES to the tape EXTAP2.

```
VSN,TAPE=EXTAP2.  
BLOCK,XX,NT,D=PE,CV=AS,RB=64,I=FILES.
```

The local file named FILES must contain the following list of files to be retrieved (if not already local) and copied:

```
ES  
STAGES  
DSTAGES  
CC  
COMPILE
```

XX is a filler parameter, since the volume serial number was specified on the VSN statement. Volume EXTAP2 will be requested. An equivalent statement would be:

```
BLOCK,,NT,D=PE,CV=AS,RB=64,I=FILES.
```

It will be a nine-track tape with 1600 cpi. The character set will be ASCII. By default, each record will be 80 characters long. There will be 64 records in a block (RB=64). This results in blocks of 5120 characters.

SAMPLE OUTPUT:

BLOCK 83/10/21. RUN ON 85/04/01. 15.33.36.

TAPE PARAMETERS

TYPE	DENSITY	CONVERSION	MODE	FORMAT	LABELS	NOISE
NT	1600	ASCII	CODED	S	KU	18

RECORD LENGTH....80
 BLOCK SIZE.....5120
 RECORDS/BLOCK....64

COPY TO EOF. EOF-S ARE KEPT.

SEQ	FILE NAME	LINES	BLOCKS	SOURCE
1.	ES	24	1	ATTACH
2.	STAGES	91	2	ATTACH
3.	DSTAGES	1	1	CPF
4.	CC	362	6	CPF
5.	COMPILE	24	1	LOCAL

5 FILES PROCESSED.
 502 LINES PROCESSED.
 11 TAPE BLOCKS WRITTEN.
 ALL FILES COPIED.

MESSAGES:

The following messages are issued to the user dayfile by BLOCK. Consult the appropriate NOS diagnostic index (Document N-13 or N2-13) if other messages appear.

MESSAGEDESCRIPTION

ALL FILES COPIED.

This is the message issued for program completion.

ARGUMENT ERROR.

The control statement has an illegal parameter or value.

BOTH F AND M MUST BE USED.

This is to ensure that the user knows what has been written to the tape.

BOTH FN AND I SPECIFIED.

Only one is allowed.

BOTH MT/NT SPECIFIED.

Only one can be used.

CV NOT AS/EB.

The only conversion modes supported are AS(ASCII) and EB(EBCDIC).

<u>MESSAGE</u>	<u>DESCRIPTION</u>
DENSITY-MT/NT CONFLICT.	The density specified is not supported on the type of tape drive specified.
EMPTY LIST OF FILES.	The file specified by the I parameter was empty or nonexistent.
F MUST BE I OR SI.	The format specified is not allowed with binary mode.
F MUST BE S OR L.	The format specified is not allowed with coded mode.
FATAL ERRORS, SEE LISTING.	The program was not able to process all files properly. The listing will give more details.
LB NOT KU/KL.	The only values of LB supported are KU and KL.
NEITHER FN NOR I USED.	The program needs to be told what file to copy.
PO VALUE ILLEGAL.	PO must be X or Z.
PO=Z ILLEGAL ON LABELED TAPES.	Using tape marks to separate files would violate the ANSI standard for labeled tapes.
RB VALUE ILLEGAL.	RB must be numeric.
RB*RL TOO BIG FOR FL.	The block size specified requires buffers that are bigger than available memory. Increase the job statement field length, or lower RB.
RL VALUE ILLEGAL.	RL must be numeric, and between 24 and 5120.
UNKNOWN DENSITY.	The density specified by the D parameter is unrecognized.
VSN MISSING.	The reel number (first parameter) is omitted and either no VSN statement was included for the file name TAPE, or TAPE already existed as local file.
VSN/SI TOO LONG.	The reel or set identifier parameter exceeds six characters.

13. UNBLOCK PROGRAM

UNBLOCK is a NOS utility program which will unblock coded data (or copy binary data) from a tape. Usage is as follows:

```

GET,UNBLOCK/UN=LIBRARY.
VSN,TAPE=vsn.
UNBLOCK,lfn,params.

```

or

```

GET,UNBLOCK/UN=LIBRARY.
UNBLOCK,vsns,params.

```

where:

lfn - local file name to receive unblocked output (default is TAPE1)
vsns - volume serial number of the tape

and valid params are:

MT, NT, D=, NS=, CV=, M=, F=, BS=, RL=, NP, SF=, NF=, QN=, SI=, LB=, FA=, EO=, EL=, and L=.

Parameters are order-independent and are described in section 11, Table 1. The contingent defaults for track and density can be found in Table 2 of section 11.

NOTES:

1. For numeric values, a post radix of D or B may be added to indicate decimal or octal values. The default is decimal. Densities are symbolic, not numeric, values.
2. To position a multifile file tape, the QN parameter must be used to specify which file is desired. The NF and SF parameters are valid only if more than one file exists within the specified sequence number (QN).

Only one file can be processed per call to UNBLOCK. In order to get more than one multifile file off the tape, UNBLOCK must be called repeatedly, changing the QN value to the number corresponding to the next (or desired) multifile file.

QN=1			QN=2			QN=3			QN=4		
V	H		E	H		E	H		E	H	
0	D	multi	0	D	multi	0	D	multi	0	D	multi
L	R	file	F	R	file	F	R	file	F	R	file
1	1	1	1	1	2	1	1	3	1	1	4

3. To position an unlabeled tape containing multiple files, the NF and SF parameters must be used. The QN parameter is not valid.

4. If F=I or F=SI, the M, NS, BS, and RL parameters are ignored unless specified illegally. M is forced to binary. NS, BS, and RL all assume the defaults for I and SI tapes. The CV parameter only applies to the labels.
5. If the tape is coded, UNBLOCK creates files with fixed-length, blank-filled, Z-type records. The COPYCF control statement may be used to remove these padding characters.

RESTRICTIONS:

Only tapes with fixed-length records are unblocked correctly. No unblocking is done on binary (internal) tapes.

If a block does not contain a multiple of RL characters, the excess data will be ignored.

Records may not span blocks.

Any local file named TAPE existing before either the VSN statement or UNBLOCK is executed will be returned by UNBLOCK.

EXAMPLES:

1. This example shows how to unblock a tape which could have been produced at an IBM, AMDAHL, or OMEGA site.

The tape is a nine-track tape with a recording density of 1600 cpi and no labels. Each block contains 32 card images of 80 characters each written in EBCDIC. The VSN of the tape is TXPGM.

```
VSN(TAPE=TXPGM)
UNBLOCK, TXPGM, NT, D=1600, LB=KU, BS=2560, RL=80, CV=EB.
```

The unblocked data will be on local file TXPGM. It might be compiled, saved, copied to another tape, text edited, etc.

Note that since NT, D=1600, LB=KU, and RL=80 are defaults they could have been left out. The block size (32*80=2560) is also less than the default block size, so BS=2560 could also be left out. Since the local file name specified is identical to the tape VSN, the VSN control statement may also be omitted. Therefore,

```
UNBLOCK, TXPGM, CV=EB.
```

would produce the same result.

2. This example shows how to copy a two-reel tape to a local file named SOURC1. The first reel is TXX1 and the second is TXX2. For simplicity's sake, let the other parameters match those in example 1.

```
VSN(TAPE=TXX1/TXX2)
UNBLOCK(SOURC1, CV=EB)
```

The VSN statement for TAPE specifies the reels to be used. SOURCE is the local file which receives the card images.

- This example shows how to extract the third file from a seven-track unlabeled tape written at 556 bpi. The file contains the source of a program; including sequence numbers, the record length is 85 characters. There are 100 records in each block. The VSN of the tape is BBSRC. The resulting file will be named BBSRC.

```
VSN,TAPE=BBSRC.
UNBLOCK,BBSRC,MT,D=556,SF=2,RL=85,BS=8500,LB=KU.
```

- The following statements will copy the second multifile off of the labeled tape TEST. TEST is a nine-track tape with a density of 1600 cpi. It is a multi-labeled tape. QN specifies that the second multifile is desired. Only the second multifile is obtained and created locally under the name RESULT.

```
VSN(TAPE=TEST)
UNBLOCK(RESULT,NT,LB,QN=2)
```

- The following statements will copy the first file off the tape NOSTAP. NOSTAP is a nine-track tape with a density of 1600 cpi (Phase Encoded). It has ANSI standard labels and was written on a NOS computer. The resulting local file will have the name NOSTAP.

```
VSN,TAPE=NOSTAP.
UNBLOCK,NOSTAP,NT,D=PE,F=I,LB.
```

SAMPLE OUTPUT:

```
UNBLOCK 84/11/09.      RUN ON 85/04/01. 09.21.52.      LFN NOSTAP
```

TAPE PARAMETERS

TYPE	DENSITY	CONVERSION	MODE	FORMAT	LABELS	NOISE
NT	1600	ASCII	BINARY	I	KL	0

```
RECORD LENGTH....N/AP
BLOCK SIZE.....5120
RECORDS/BLOCK....N/AP
```

```
QN= 1 SI=          FA=
SKIP FILES.....0
NUMBER OF FILES..1
ERROR LIMIT.....0
ERROR OPTIONS....IGNORE....NOPRINT
PACKING IS.....ON
```

```
FILE NUMBER...BLOCKS READ...MODE USED
```

```
                1          5          BINARY
UNBLOCK COMPLETE.
```

MESSAGES:

The following messages are issued to the user dayfile by UNBLOCK. Consult the appropriate NOS diagnostic index (Document N-13 or N2-13) if other messages appear.

<u>MESSAGE</u>	<u>DESCRIPTION</u>
ARGUMENT ERROR.	The parameter list contains a null parameter, or a keyword is not recognized.
BLOCK LONGER THAN SPECIFIED.	A block has been read that is longer than the value of the BS parameter. There is insufficient buffer space to handle it.
CV NOT EB/AS.	The conversion code is neither ASCII(AS) nor EBCDIC(EB).
DENSITY UNKNOWN.	The density is not one of the allowed values.
ERR CODE=nnnnnnnnnn	This message is issued in conjunction with other error messages to clarify the error condition. The error code is octal.
ERROR IN BLOCK SIZE.	The BS parameter is not numeric or is greater than 131071.
ERROR IN EL VALUE	The EL value is not numeric.
ERROR IN EO VALUE.	Error options must be some combination of P and A or P and I.
ERROR IN PARAMETER.	M parameter value must be CODED or BINARY.
ERROR IN NF VALUE.	The NF value is not numeric.
ERROR IN NS VALUE.	The NS value is not numeric or is too big.
ERROR IN QN VALUE.	The QN value is not numeric or is too big.
ERROR IN RL VALUE.	The RL value is not numeric.
ERROR IN SF VALUE.	The SF parameter is not numeric.
ERROR LIMIT.	The value specified by EL has been exceeded.
ERROR SKIPPING FILES ON TAPE.	An error occurred while skipping the requested number of files. The message preceding this one in the dayfile identifies the error code.
FILE MORE THAN 9 TAPES LONG.	UNBLOCK can set up a procedure for copying a maximum of nine tapes.

<u>MESSAGE</u>	<u>DESCRIPTION</u>
FORMAT UNKNOWN.	The specified format must be I, SI, S, or L.
LB NOT KU/KL/NS.	Label parameter must be one of those specified.
MT/NT CONFLICT.	Both the MT and NT options were included.
READ FAILED ON CW.	Internal program problem. No data was returned on a read, but neither was an abnormal status. If the problem persists, contact User Consultation, ext. 3548.
READ FAILED ON DATA.	The program did not receive the number of words the system said should have been read. If the problem persists, contact User Consultation, ext. 3548.
READ FAILED ON LVL NO.	The trailer word is missing from the last data block. If the problem persists, contact User Consultation, ext. 3548.
REQUESTING TAPE.	An error occurred while requesting the tape. The message preceding this one in the dayfile identifies the error code.
SI MORE THAN 6 CHARS.	Set identifier is limited to six characters.
TYPE/DENSITY MISMATCH.	The requested density does not exist for the specified tape type (MT/NT).
UNBLOCK COMPLETE.	The program completed normally.
VSN MISSING	Neither the VSN parameter nor a VSN statement for the tape was supplied.
VSN TOO LONG.	The VSN must not exceed six characters.

14. PROGRAM TAPEDMP

TAPEDMP is a NOS utility program that will perform an analysis of a magnetic tape. It can dump, analyze, or list labels on either seven- or nine-track magnetic tape. The analysis can be one of the following:

- 1) determine the recording mode (ASCII, EBCDIC, or binary for nine-track; BCD or binary for seven-track) and summarize the analysis of a specified number of data blocks.
- 2) print the data in either alphanumeric, octal, hexadecimal, or external BCD.
- 3) list all magnetic tape labels.

Usage is as follows:

```
GET(TAPEDMP/UN=UTIL)      or      GET(TAPEDMP/UN=LIBRARY)
TAPEDMP.                  TAPEDMP.
```

TAPEDMP uses files INPUT and OUTPUT by default. Alternate file names may be specified by using the following form:

```
TAPEDMP(infile,outfile)
```

where infile is a local file and positioned properly. If TAPEDMP executes at an interactive terminal, outfile is formatted for terminal output. The magnetic tape to be analyzed must be requested prior to program execution. The file name on the LABEL control statement must be TAPE1. The tape must be requested as follows:

```
LABEL(TAPE1, {MT}, {NT}, D=den, F=L, PO=R, CV={AS}, {EB}, LB={KL}, {KU}, VSN=vsn)
```

where selections must be made for number of tracks (MT/NT), recording density (den), ASCII or EBCDIC (AS/EB) conversion, and labeled or unlabeled (KL/KU). The volume serial number (vsn) identifies the tape to be dumped. Refer to document N-2 (or N2-2) for detailed LABEL statement parameter descriptions.

Input is passed to TAPEDMP in FORTRAN NAMELIST form. NPUT is the name of the NAMELIST. The NAMELIST data variables are as follows:

```
NFILE =      number of files to analyze
              Default value is 1.

NREC =      number of records to analyze
              Default is all records.

MODE =      processing mode for magnetic tape
              = 0 indicates ASCII for nine-track tapes
                indicates BCD for seven-track tapes
```

= 1 indicates binary
 = 2 indicates EBCDIC for nine-track tapes
 CV=EB must be specified on the tape request.
 = 4 request to analyze data and determine correct mode
 Default value is 4.

ISTART = record number to begin printing
 Default value is 1.

PRCODE = detail print code
 = 0 no detail print
 = 1 octal print
 = 2 alphanumeric print
 = 3 octal and alphanumeric
 = 4 hexadecimal print (nine-track tapes only)
 = 5 external BCD print (seven-track tapes only)
 Default value is 0, PRCODE must be specified if detail printing is desired.

PRFILE = file number in which to start detail print
 Default value is 1. Printing continues through NFILE.

NUMPRT = number of records per file to print
 Default is all records.

PECODE = parity error print code
 = 1 no parity error print
 = 0 print parity error records according to PRCODE
 (IF PRCODE=0, the parity error record is printed in octal).
 Default value is 1.

LO = list label option
 To list the labels, the LB=KU parameter must be included on the LABEL control statement and the tape format must be either S or L.

= 0 do not list labels

≠ 0 list all tape labels

When this option is selected, all other TAPEDMP parameters are ignored.

Similar information is available from the LISTLB control statement which is described in documents N-2 and N2-2.

Default value is 0.

LENGTH = length in words of the longest block to be read

A length greater than 514 requires that the run time field length be increased by using the RFL and REDUCE(-) control statements. The execution field length (23100 octal) should be increased by the amount over 514.

Default value is 514.

EXAMPLE:

The following series of control statements illustrates the use of TAPEDMP in a batch job.

```
jobname,...  
USER,...  
CHARGE,...  
DELIVER. delivery  
GET(TAPEDMP/UN=LIBRARY)  
LABEL(TAPE1,NT,D=PE,F=L,PO=R,VSN=PFLANA,LB=KU)  
TAPEDMP.  
7/8/9 -end-of-record-  
  $NPUT NFILE=3, PRCODE=1, NUMPRT=1 $END  
6/7/8/9 -end-of-information-
```

NOTES:

TAPEDMP will only process magnetic tape files that are requested with a local file name of TAPE1.

Extreme caution should be exercised when using the detail print options. Injudicious usage can result in large volumes of printed output.

For seven-track tapes, if a mode is specified, an attempt will be made to read the tape in this mode and the mode will only be switched if an error is encountered.

Any job requiring a seven-track tape drive should use the logical id MT7 to force job processing to an appropriate NOS computer. (Refer to ROUTE or job control statement ST parameter descriptions in documents N-2 and N2-2).

In the printout from TAPEDMP, the mode for coded tapes is indicated as ASCII/BCD. This implies that the mode is ASCII if the tape is nine-track and that the mode is BCD if the tape is seven-track.

When detail printing is requested (PRCODE), the unused bit count will be indicated in the printout for each record.

The TAPEDMP program attempts to process all errors occurring during the execution and will override system aborts that would normally occur during job processing. If an error occurs and TAPEDMP determines that it cannot continue, the following message will be issued in the dayfile and the program aborted:

SYSTEM ABORT - ERROR FLAG=xx.

where:

xx = RPV (REPRIEVE) error code

Refer to Table 2-10-1 in Document N-6, or Table 10-1 in Document N2-6.

MESSAGES:

The following messages are issued by TAPEDMP:

<u>MESSAGE</u>	<u>DESCRIPTION</u>
LENGTH IS NOT GT THAN ZERO	This indicates that a system error has occurred in creating the file buffer.
TAPE1 MUST BE A TAPE FILE	TAPEDMP will only read a magnetic tape file.
TAPE IS NOT LABELED	List label option was specified but tape labels have not been found. This will occur if a labeled tape is requested without the LB=KU parameter.
END-OF-TAPE ENCOUNTERED,TAPE DUMP TERMINATED	The end-of-tape has been encountered on this reel of magnetic tape. Dumping is terminated.
EOF ENCOUNTERED	A physical tape mark was encountered.
LEVEL 17 EOF ENCOUNTERED	A software-recorded level 17 EOF was encountered.
INVALID INPUT DATA	The data specified by the NAMELIST input is invalid or cannot be used as specified.
END OF TAPE DUMP	The execution of TAPEDMP has terminated.

SAMPLE OUTPUT.

FILE 1 RECORD 1 WAS READ IN BINARY MODE AND CONTAINS 30 WORDS
THE UNUSED BIT COUNT IS 40

```

W 1 04000000000000400211 30005240000000000000 00000000000000000000
W 4 00000000000000000000 00000000000000000000 00000000000000000000
--ABOVE LINE REPEATED--
W 10 00000000000000000000 0000440004000002000 00000000000000000000
W 13 00000000000000000000 00000000000000000000 00000000000000000000
W 16 00002200010000004000 14227040222471242124 35222025211123647040
W 19 25042523250200401002 00401002004010020040 10020040100200401002
W 22 00401002004010020040 10020040100200401002 00401002004010020040
W 25 10020040100200401002 00401003046313247503 25026470146000611403
W 28 50651423506014600000 00000000000000000000 00000000000020004560
    
```

FILE 1 RECORDS 2 THRU 1585 WERE READ IN BINARY MODE
AND CONTAINS 616 WORDS

FILE 1 EOF ENCOUNTERED

FILE 2 RECORD 1 WAS READ IN BINARY MODE AND CONTAINS 30 WORDS
THE UNUSED BIT COUNT IS 40

```

W 1 04000000000000400231 30003000000000000000 00000000000000000000
W 4 00000000000000000000 00000000000000000000 00000000000000000000
--ABOVE LINE REPEATED--
W 10 00000000000000000000 0000440004000005000 00000000000000000000
W 13 00000000000000000000 00000000000000000000 00000000000000000000
W 16 00002200010000004000 24440515240201242125 19241002146110020040
W 19 10020040100200401002 00401002004010020040 10020040100200401002
W 22 00401002004010020040 10020040100200401002 00401002004010020040
W 25 10020040100200401002 00401003046313247503 25026470146000611403
W 28 50651423506014600000 00000000000000000000 00000000000020004560
    
```

FILE 2 RECORDS 2 THRU 565 WERE READ IN BINARY MODE
AND CONTAINS 616 WORDS

FILE 2 EOF ENCOUNTERED

FILE 3 RECORD 1 WAS READ IN BINARY MODE AND CONTAINS 30 WORDS
THE UNUSED BIT COUNT IS 40

```

W 1 04000000000000400231 30003300000000000000 00000000000000000000
W 4 00000000000000000000 00000000000000000000 00000000000000000000
--ABOVE LINE REPEATED--
W 10 00000000000000000000 0000440004000001000 00000000000000000000
W 13 00000000000000000000 00000000000000000000 00000000000000000000
W 16 00002200010000004000 14627040100501252325 01042365351610021461
W 19 10020040100200401002 00401002004010020040 10020040100200401002
W 22 00401002004010020040 10020040100200401002 00401002004010020040
W 25 10020040100200401002 00401003046313247503 25026470146000611403
W 28 50651423506014600000 00000000000000000000 00000000000020004560
    
```

FILE 3 RECORDS 2 THRU 756 WERE READ IN BINARY MODE
AND CONTAINS 616 WORDS

FILE 3 EOF ENCOUNTERED

END OF TAPE DUMP

AIDS:

Some interactive procedures to assist in the use of TAPEDMP are available via the Information Tree (Document A4).

NOTE

Documentation for TAPEDMP also appears in "Guide to Utility Libraries and Software Tools": Document N-36 or N2-36.

REFERENCE LIST

The related publications referenced in this document are listed below. Because similar information can be found in the documentation series for NOS 1.4 and NOS 2.3, both references are given when two exist.

<u>Number</u>	<u>Document Title</u>
A-4	Information Tree User's Guide
N-2	NOS Version 1 Reference Manual, Volume 2
N2-2	NOS Version 2 Reference Set, Volume 3
N-6	NOS Version 1 Reference Manual, Volume 2
N2-6	NOS Version 2 Reference Set, Volume 4
N-13	NOS Version 1 Diagnostic Index
N2-13	NOS Version 2 Diagnostic Index
N-19	CYBER Record Manager Basic Access Methods Version 1.5 Reference Manual
N2-19	CYBER Record Manager Basic Access Methods Version 1.5 Reference Manual
N-20	CYBER Record Manager Basic Access Methods Version 1.5 User's Guide
N2-20	CYBER Record Manager Basic Access Methods Version 1.5 User's Guide
N-33	DMS-170 FORM Version 1 Reference Manual
N2-33	DMS-170 FORM Version 1 Reference Manual
N-34	8-Bit Subroutines Reference Manual
N2-34	8-Bit Subroutines Reference Manual
N-36	Guide to Utility Libraries and Software Tools
N2-36	Guide to Utility Libraries and Software Tools
S-5	CDC VSOS Version 2 Reference Manual Volume 1

INDEX

	PAGE
ACD.....	2, 30
analog.....	3
ANSI.....	2, 14
ASCII.....	2, 6
BCD.....	2, 6, 29
binary.....	2, 6
bit.....	1, 4, 5, 6
BLOCK.....	18, 19, 31, 36
block; blocking; blocked.....	2, 6, 13, 19, 20, 31
bpi.....	1
capacity.....	11, 14, 16
certification.....	3, 7, 8, 13
coded.....	2, 6
continuation reel.....	16, 17, 19, 27, 28
COPY.....	31
COPY8P.....	21, 31
critical-hold.....	18
DCM.....	30
DEC.....	23
degauss.....	3
density.....	1, 20
drive.....	27
EBCDIC.....	2, 6

even parity.....	1, 2, 20, 22
field tape.....	3
FORM.....	21, 24, 31
format.....	1
frame.....	1, 5
GCR.....	5, 6
HP.....	23
IBM.....	23
ICOPS.....	29
interblock gap.....	2, 11
interrecord gap.....	2, 5
LABEL.....	14, 15
labels.....	2, 26, 27
LaRC.....	1, 3, 22
librarian.....	18, 26
library.....	2, 7, 14, 26, 27
LIDs.....	1
LIMITS.....	30
LISTLB.....	16, 18, 47
logical record.....	2, 20
maintenance.....	8
marked parity.....	25
messages.....	9, 38, 43, 48
MODCOMP.....	24
multifile.....	14, 15, 16, 18, 40
nine-track.....	4, 20

NOS.....	1, 9, 14, 15, 19, 22, 27, 30, 31
NRZI.....	5, 6
odd parity.....	1, 2, 20, 22
oxide.....	3, 4, 7, 9
Parity, even, odd, marked.....	1, 4, 5, 20, 25
PDP.....	22
PE.....	5, 6
PRIME.....	24
PRU.....	2, 11, 13
record.....	2, 21
reel.....	2, 8, 11
RESOURC.....	30
seven-track.....	1, 4, 20, 29
tape drive.....	1, 7
TAPEDMP.....	45
TCOPY.....	19, 31
UNBLOCK.....	18, 20, 31, 40
unblocked.....	2, 19
validation.....	30
VAX.....	23
volume.....	2, 15, 27
VPS-32.....	22
VSN.....	2, 15, 26, 27, 28, 36, 40

Standard Bibliographic Page

1 Report No NASA CR-177993	2 Government Accession No	3 Recipient's Catalog No	
4 Title and Subtitle Magnetic Tape User Guide		5 Report Date September 1985	
		6 Performing Organization Code	
7 Author(s) Agnes B. Evans Lucia L. Lee		8 Performing Organization Report No	
		10 Work Unit No	
9 Performing Organization Name and Address System Development Corporation 105 Research Drive Hampton, VA 23666		11 Contract or Grant No NAS1-17300	
		13 Type of Report and Period Covered Contractor Report	
12 Sponsoring Agency Name and Address National Aeronautics and Space Administration Washington, DC 20546		14 Sponsoring Agency Code 505-60-01-01	
		15 Supplementary Notes Langley Technical Monitor: James L. Harris	
16 Abstract This User Guide provides a general introduction to the structure, use, and handling of magnetic tapes at LaRC. The topics covered are tape terminology, physical characteristics, error prevention and detection, and creating, using, and maintaining tapes. Supplementary documentation is referenced where it might be helpful. The documentation is included for the tape utility programs, BLOCK, UNBLOCK, and TAPEDMP, which are available at the Central Scientific Computing Complex at LaRC.			
17 Key Words (Suggested by Authors(s)) Computer Operations Computer Hardware Magnetic Tape Tape Drives		18 Distribution Statement Unclassified - Unlimited Star category 60	
19 Security Classif (of this report) unclassified	20 Security Classif (of this page) unclassified	21 No of Pages 57	22 Price A04

For sale by the National Technical Information Service, Springfield, Virginia 22161

End of Document