



7000 SERIES DATA PROCESSING SYSTEMS BULLETIN

IBM HYPERTAPE INPUT/OUTPUT CONTROL SYSTEM
FOR 7000 SERIES DATA PROCESSING SYSTEMS

The IBM HYPERTAPE Input/Output Control System provides users of IBM 7074, 7080 and 7090 Data Processing Systems with efficient routines for reading and writing tape records using IBM 7340 HYPERTAPE Drives.

This bulletin describes the basic features of the HYPERTAPE Input/Output Control System and outlines the tape format specifications for use with it. A detailed description of the HYPERTAPE Input/Output Control System for the IBM 7074, 7080 and 7090 Data Processing Systems will be made available at a later date.

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Features Of The HYPERTAPE Input/Output Control System

The advantages of reduced programming time, efficiency of operation and standardization of procedures are obtained by use of the HYPERTAPE Input/Output Control System as a result of the following features:

Reading and writing of tape records, both forward and backward, is controlled by the HYPERTAPE Input/Output Control System and will occur concurrently with processing.

Routines are provided for processing data records that are to be written on, or read from, HYPERTAPE. These routines handle each data record sequentially, even though data records may be blocked on tape. Blocking of output data records and deblocking of input data records are handled automatically by the HYPERTAPE Input/Output Control System.

To check the mounting of HYPERTAPE cartridges for each program run and to aid the maintenance of the tape library, a tape reel control system is included in the HYPERTAPE Input/Output Control System. Through the use of standard tape labels written on tape, each HYPERTAPE reel is identified and checked before it is used in a program.

A program using the HYPERTAPE Input/Output Control System may be interrupted at any time and continued from that point at another time by the use of checkpoint and restart routines.

Error routines are included in the HYPERTAPE Input/Output Control System. These routines are designed to correct errors automatically when possible, and to provide certain statistical accounting of tape operations.

The HYPERTAPE Input/Output Control System is designed to permit the operation of IBM 7340 HYPERTAPE Drives and IBM 729 Magnetic Tape Drives in the same program.

HYPERTAPE Format Specifications

The following three sections describe the specifications for tape file, label, and tape record formats to be used in planning the HYPERTAPE Input/Output Control System for IBM 7000 series computers.

Tape File Format Specifications

Figure 1 illustrates four basic tape formats using the following standards:

1. Single-Reel File

The first record on tape is a standard HYPERTAPE header label followed by a tape mark. This tape mark is followed by the first record of the tape file. A tape mark immediately follows the last record of the tape file. This tape mark is followed by an EOF trailer label and another tape mark character.

2. Multi-File Reel

Each file on a multi-file reel has the identical format of the single-reel file.

3. Multi-Reel File

The multi-reel file is a file identical in format to the single-reel file except that the trailer labels on all reels but the last are EOR trailer labels. The last reel of the file has an EOF trailer label.

4. Checkpoints on Data Tapes

Checkpoint records on data tapes are located immediately following the tape mark that follows the header labels. The checkpoint records are immediately followed by a tape mark, which precedes the next record of the tape file.

Label Format Specifications

The following format pertains to all standard HYPERTAPE labels. All labels will be 120 characters in length.

<u>FIELD</u>	<u>POSITION(s)</u>	<u>FIELD NAME</u>
1	1-5 6	Label Identifier blank
2	7-10	Retention Period
3	11-15	Creation Date
4	16-25	File Identification
5	26-30	File Serial Number
6	31-35 36	Reel Serial Number blank
7	37-40 41, 42	Reel Sequence Number blanks
8	43-45	Reserve
9	46	Checksum Indicator
10	47	Block Sequence Indicator
11	48	BCD/Binary Indicator
12	49 50	Packed/Unpacked Indicator blank
13	51-54	Creating System
14	55	Record Format
15	56-60	Record Length
16	61-65	Block Size
17	66	Checkpoint Indicator
18	67-72	Block Count
19	73-90	Reserved
20	91-120	For Optional Usage

Figure 2 illustrates the format of HYPERTAPE labels; a description and definition of the fields by name and number follows:

<u>NUMBER</u>	<u>NAME</u>	<u>DESCRIPTION</u>
1	Label Identifier	This field may contain one of three different configurations: 1HDRb to indicate a header label 1EORb to indicate an End-of-Reel trailer label 1EOFb to indicate an End-of-File trailer label
2	Retention Period	Number of days (0001-9999) this file is to be retained after the creation date.
3	Creation Date	The year and day of the year the file was created. The year occupies the first two positions (00-99) and the day of the year (001-366) occupies the last three

<u>NUMBER</u>	<u>NAME</u>	<u>DESCRIPTION</u>
		positions. (e.g., January 31, 1962 would be entered as 62031.)
4	File Identification	A distinct or unique 10-character name or number identifying the entire file.
5	File Serial Number	A five-digit number which is the same as the Reel Serial Number of the first or only reel of the file.
6	Reel Serial Number	This five-digit field is a number that was initially assigned to the reel of tape when it entered the system. This number normally appears on the outer surface of the cartridge for visual identification.
7	Reel Sequence Number	This four-digit number (0001-9999) gives the order of this reel within a given file.
8	Reserve	This 3-character field is reserved for future Applied Programming use.
9	Checksum Indicator	Indicates the presence or absence of checksums. For 7090 systems use.
10	Block Sequence Indicator	Denotes the presence or absence of Block Sequencing. For 7090 systems use.
11	BCD/Binary Indicator	Indicates whether tape data is in BCD form or Binary form. For 7090 systems use.
12	Packed/Unpacked Indicator	Denotes whether data is in compressed form or not.
13	Creating System	Denotes the system which created the tape. (e.g., 7074)
14	Record Format	Indicates the record format found on this reel of tape.

HYPER TAPE HEADER AND TRAILER LABEL FORMAT

FIELD NUMBER	1	2	3	4	5	6
1	H D R b					
1	E O F b b	R E T N	C R E A T	F I L E I D E N T N	F S E R #	R S E R # b
1	E O R b					
	5 6	10	15	25	30	35 36

FIELD NUMBER	7	8	9	10	11	12	13	14	15	16	17	18										
	R S E Q	b b	R E S	CHKSUM	BLKSEQ	BCDBIN	PACKED	b	7 0 7 4	7 0 8 0	7 0 9 0	RECFORM	R E C L N	B L K S Z	C B L K C N T							
	37 40	42	45					50				54 55				60			65 66			72

- NOTES
1. Field 19 (Positions 73-90) are reserved for use by IBM Applied Programming.
 2. Field 20 (Positions 91-120) may be employed by the user.
 3. Field 18 is not used in header labels.

Figure 2

<u>NUMBER</u>	<u>NAME</u>	<u>DESCRIPTION</u>
15	Record Length	For fixed length records, this field gives the number of characters per logical data record; for variable length records, this field gives the number of characters for the largest possible logical data record of this file.
16	Block Size	For fixed length records, this field denotes the number of logical data records within each tape record; for variable length records, this field denotes the number of characters for the largest possible tape record of this file.
17	Checkpoint Indicator	This indicator denotes the presence or absence of checkpoint records.
18	Block Count	Indicates number of tape records written on this reel for this file. This field applies to trailer labels only.
19	Reserved	This field is reserved for Applied Programming usage.
20	For Optional Usage	Positions 91 through 120 may be employed as an area for additional label data at the option of the user.

Tape Record Format Specifications

Tape record formats complying with current standards on the 7074, 7080 and 7090 systems will be processed by the HYPERTAPE Input/Output Control System. Exceptions must be made of those hardware-oriented record formats which are incompatible with HYPERTAPE operation, (e.g., elimination of 7074 Form 2 records for backwards reading.)

INTERCHANGE OF HYPERTAPE CARTRIDGES

In order to provide for the interchange of HYPERTAPE cartridges among IBM 7074, 7080 and 7090 Data Processing Systems, the following tape record formats must be followed:

1. Fixed Length Records with Fixed Blocking Factor

Tape records as well as logical data records must be a multiple of 30 characters in length. All data records must have a terminating record mark. The multiple of 30 characters includes the terminating record mark.

The blocking factor is fixed for every tape record of the file. In order to eliminate the need for tape record padding, the HYPERTAPE Input/Output Control System will accept tape blocks containing fewer logical records than the blocking factor.

2. Variable Length Records with Variable Blocking Factor

Every logical data record must be a multiple of 30 characters in length. The multiple of 30 characters includes a terminating record mark and a five character field (denoting the length, in characters, of the data record) at the immediate start of each data record. This length field is right-justified with leading zeros included when necessary.

Further requirements for HYPERTAPE exchange between 7000 series systems are:

1. All tape information must be in BCD form.
2. All information written on tape by the 7074 system must be in the alpha mode to eliminate delta characters.
3. The 7090 and 7080 systems must not write the delta character on tape.
4. All data must be in the unpacked mode.

PUBLICATIONS

The following HYPERTAPE literature has been published as of the date of this bulletin:

MACHINE PUBLICATIONS

<u>Form Number</u>	<u>Title</u>
A22-6616	Reference Manual, 7340 HYPERTAPE Drive
G22-6614	7074 Data Processing System Bulletin, 7340 HYPERTAPE Drive
G22-6617	7080 Data Processing System Bulletin, 7340 HYPERTAPE Drive
G22-6634	7090 Data Processing System Bulletin, 7340 HYPERTAPE Drive

SYSTEMS PUBLICATIONS

<u>Form Number</u>	<u>Title</u>
J28-6150	Bulletin, IBM 7074 with IBM 7340 HYPERTAPE Drives: Programs and Programming Systems
J28-6151	Bulletin, IBM 7080 with IBM 7340 HYPERTAPE Drives: Programs and Programming Systems
J28-6152	Bulletin, IBM 7090 with IBM 7340 HYPERTAPE Drives: Programs and Programming Systems
J28-6153	Bulletin, IBM HYPERTAPE Input/Output Control System for 7000 Series Data Processing Systems
J28-6154	Bulletin, IBM 7074 Generalized Sorting Program Using IBM 7340 HYPERTAPE Drives: Specifications and Timing Estimates
J28-6155	Bulletin, IBM 7080 Generalized Sorting Program Using IBM 7340 HYPERTAPE Drives: Specifications and Timing Estimates
J28-6156	Bulletin, IBM 7090 Generalized Sorting Program Using IBM 7340 HYPERTAPE Drives

