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MAGNETIC TAPE LABELS AND FILE STRUCTURE FOR INFORMATION INTERCHANGE

CATEGORY: SOFTWARE STANDARD

SUBCATEGORY: OPERATING PROCEDURES

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Foreword

The Federal Information Processing Standards Publication Series of the National Bureau of Standards is the official publication relating to standards adopted and promulgated under the provisions of Public Law 89-306 (Brooks Act) and under Part 6 of Title 15, Code of Federal Regulations. These legislative and executive mandates have given the Secretary of Commerce important responsibilities for improving the utilization and management of computers and automatic data processing in the Federal Government. To carry out the Secretary's responsibilities, the NBS, through its Institute for Computer Sciences and Technology, provides leadership, technical guidance and coordination of Government efforts in the development of guidelines and standards in these areas.

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Abstract

This publication announces the adoption of X3.27-1978, American National Standard Magnetic Tape Labels and File Structure for Information Interchange, as a Federal Standard. This standard establishes four levels of labeling, label formats, blocking structure, and tape-mark relationships on magnetically recorded tapes (volumes) so that these volumes can be used for information interchange.

This standard contains specifications for processing volumes that correspond to a level of this standard to ensure proper treatment and understanding of these volumes and their contents in information interchange. The implementation of these processing specifications is called the system. A system exists for each level.

KEY WORDS: Data interchange; Federal Information Processing Standards Publication; file structure; magnetic tapes; tape labels.

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ANNOUNCING THE STANDARD FOR

MAGNETIC TAPE LABELS AND FILE STRUCTURE FOR INFORMATION INTERCHANGE

Federal Information Processing Standards Publications are issued by the National Bureau of Standards pursuant to the Federal Property and Administrative Services Act of 1949, as amended, Public Law 89-306 (79 Stat. 1127), Executive Order 11717 (38 FR 12315, dated May 11, 1973) and Part 6 of Title 15 Code of Federal Regulations (CFR).

1. **Name of Standard.** Magnetic Tape Labels and File Structure for Information Interchange (FIPS PUB 79).

2. **Category of Standard.** Software Standard, Operating Procedures.

3. **Explanation.** This publication announces the adoption of X3.27-1978, American National Standard Magnetic Tape Labels and File Structure for Information Interchange, as a Federal Standard. This standard establishes four levels of labeling, label formats, blocking structure, and tape-mark relationships on magnetically recorded tapes (volumes) so that these volumes can be used for information interchange.

This standard contains specifications for processing volumes that correspond to a level of this standard to ensure proper treatment and understanding of these volumes and their contents in information interchange. The implementation of these processing specifications is called the system. A system exists for each level.

Each implementation of this standard is expected to be able to produce and accept volumes that correspond to a level of this standard.

Any volume or volume set (defined in X3.27-1978 as a collection of related volumes) of a given level can be processed correctly by any system of equal or higher level; and any level system can process correctly any volume or volume set of equal or lower level. For example, a level 1 volume can be processed correctly on system levels 1, 2, 3, and 4. Similarly, system level 3 can process correctly volumes produced by system levels 1, 2, and 3.

4. **Approving Authority.** Secretary of Commerce.

5. **Maintenance Agency.** U.S. Department of Commerce, National Bureau of Standards (Institute for Computer Sciences and Technology).

6. **Cross Index.** American National Standard X3.27-1978, Magnetic Tape Labels and File Structure for Information Interchange.

7. Related Documents.

a. American National Standard Code for Information Interchange, X3.4-1968 (FIPS PUBS 1 and 7), X3.4-1977.

b. American National Standard Recorded Magnetic Tape for Information Interchange (9-Track, 200 CPI, NRZI), X3.14-1973.

c. American National Standard Recorded Magnetic Tape for Information Interchange (9-Track, 800 CPI, NRZI), X3.22-1973, FIPS PUB 3-1.

d. American National Standard COBOL, X3.23-1974, FIPS PUB 21-1.

e. American National Standard FORTRAN, X3.9-1978.

f. American National Standard Representation for Calendar Date and Ordinal Date for Information Interchange, X3.30-1971, FIPS PUB 4.

g. American National Standard Recorded Magnetic Tape for Information Interchange (9-Track, 1600 CPI, Phase-Encoded), X3.39-1973, FIPS PUB 25.

h. American National Standard Unrecorded Tape, X3.40-1973.

i. American National Standard Representation of Numeric Values in Character Strings for Information Interchange, X3.42-1975.

j. American National Standard Recorded Magnetic Tape for Information Interchange (9-Track, 6250 CPI, Phase-Encoded), X3.54-1976, FIPS PUB 50.

k. American National Standard for Bibliographic Information Interchange on Magnetic Tape, Z39.2-1971.

l. Transmittal Form for Describing Computer Magnetic Tape File Properties, FIPS PUB 53.

m. Guidelines for Describing Information Interchange Formats, FIPS PUB 20.

8. Objectives. The objective of this standard is to reduce the difficulty of interchange of information recorded on magnetic tapes between different users and different computing systems. This objective is accomplished by specifying the format, content, and arrangement of magnetically recorded labels that identify and structure files and by specifying the format and arrangement of the blocks that contain the records that constitute a file.

The attainment of this objective, from a government-wide point of view, depends upon the widespread availability and use of systems that comply with this standard. Thus, the general intent of this publication is to provide a standard means of recording machine sensible labels, record formats (fixed, variable, and spanned), and file-volume combinations (single-file single-volume, single-file multi-volume, multi-file single-volume, multi-file multi-volume) in an interchange environment.

9. Applicability. This standard is applicable to all Federal departments and agencies. Information processing systems which either generate magnetic tapes for information interchange or accept magnetic tapes for information interchange shall have the capability of generating and processing magnetic tape labels and file structure in conformance with this standard. The standard shall be used in the interchange of magnetic tapes unless the interchange parties can agree on an alternate interchange format which is more efficient, convenient, and cost-effective.

10. Specifications. This standard adopts, with the qualifications noted in this section, the American National Standard X3.27-1978 for Magnetic Tape Labels and File Structure for Information Interchange.

The Federal Standard contains the same four levels of labeling described in X3.27-1978. Three of the main constituents of a level--the file formats, the labels used, and the record formats, are described in the following table. Each constituent contains two or three options. Within each option the types of file formats, labels, and record formats permitted for that option are listed.

Constituent	Option	Type
File Format	1	Single-file single-volume and single-file multi-volume
	2	Single-file single-volume, and single-file multi-volume, and multi-file single-volume, and multi-file multi-volume
Labels	1	VOL1 HDR1 EOV1 EOF1
	2	VOL1 HDR1 HDR2 EOV1 EOV2 EOF1 EOF2
Record Format	1	Fixed
	2	Fixed and variable
	3	Fixed, and variable, and spanned

The four levels of labeling in the Federal Standard numbered 1, 2, 3, and 4 in increasing order of complexity are made up of the constituent options as follows:

SUMMARY OF LEVEL CONSTITUENTS

	File Format	Labels	Record Format
Level 1	Option 1	Option 1	Option 1
Level 2	Option 2	Option 1	Option 1
Level 3	Option 2	Option 2	Option 2
Level 4	Option 2	Option 2	Option 3

10.1 Qualifications.

a. ANSI X3.27-1978 specifies the use of the American National Standard Code for Information Interchange (ASCII), X3.4-1977, as the character code in representing the labels and data. For the purposes of this standard, American National Standard Code for Information Interchange defined in FIPS PUBS 1 and 7 replaces all references to ANSI X3.4-1977 and ASCII in ANSI X3.27-1978. All labels and data will be recorded in the character code defined in FIPS PUBS 1 and 7.

b. Appendix A, "Levels of Systems," and Appendix B, "Utilization of this Standard," of ANSI X3.27-1978 are not part of the Federal standard specifications, but are useful for the concepts and guidance they contain, and will be considered in resolving interpretations.

c. This standard requires that the following "mechanisms" described in ANSI X3.27-1978, Section 1.3.1 (2) through (6) be provided in the system and that the documentation of these mechanisms be supplied in a separate document on preparing and using "interchange tapes." This document shall be a user's manual for producing and reading magnetic tapes conforming to this standard. The use of label facilities through each standard programming language supplied with the computer system (Federal or ANSI) shall be separately described as well as any utilities capable of supporting this standard. The required document can be provided as an index which references applicable portions of existing documents. A single complimentary copy of this user's manual shall be transmitted to NBS for informational purposes, at the address cited in Section 11.3. The mechanisms are:

*A mechanism for a system to obtain information from a program, operator, installation, or user, as appropriate, to initialize, create, or verify labels.

*A mechanism for a system to communicate information to a program, operator, installation, or user, as appropriate, with respect to errors or unusual conditions.

*A mechanism for a program, operator, installation, or user, as appropriate, to choose among the alternatives the system makes available.

*A mechanism for a program, operator, installation, or user, as appropriate, to invoke a facility the system makes available.

*A mechanism to pass control to an installation volume label processing routine to process user volume labels, or to an application program routine to process user file labels if these labels are available in an implementation.

Although programming language extensions to Federal standard programming languages or ANSI programming languages are not required by this standard, extensions to these languages may be one of the means through which vendors implement the mechanisms described above. Utility programs or a job control language are also acceptable alternatives.

11. **Implementation.** Implementation of this standard is divided into four areas of consideration: acquisition of a tape label processing facility, conformance to this standard, interpretation of this standard, and use of this standard.

11.1 **Acquisition of a Tape Label Processing Facility.** The provisions of this standard are effective October 17, 1981. Whenever a 9-track tape drive is acquired or when a new tape label processing facility is acquired, and the applicability criterion, Section 9, has been met, then the computer system must implement the specifications of this standard unless a waiver described in Section 12, Waivers, has been obtained. These requirements are applicable to tape label processing facilities developed in-house, acquired as part of an ADP system procurement, acquired by separate procurement, acquired as part of a time-sharing procurement, or used under an ADP leasing arrangement. Several of the standards listed in Section 7, Related Documents, provide the specifications for the recorded and unrecorded magnetic tapes.

11.2 **Conformance to this Standard.** A tape label processing facility that conforms to this standard must provide for all of the requirements defined in Section 10, Specifications, of this standard. Each implementation must conform to one of the four levels of the standard.

Optional portions of X3.27-1978 are not required for this standard. If the optional portions are implemented, they must be in conformance with X3.27-1978.

11.3 **Interpretation of the Standard.** NBS will provide for the resolution of questions regarding this standard, and will issue official interpretations of the specifications and requirements.

All questions arising about the interpretation of this standard should be addressed to:

Standards Administration Office
Institute for Computer Sciences and Technology
National Bureau of Standards
Washington, D.C. 20234

11.4 **Use of this Standard.** This standard must be used as described in Section 9, Applicability.

12. **Waivers.** Heads of agencies may request that the requirements of this standard for the acquisition of a tape label processing facility or the interchange of information on 9-track magnetic tapes be waived in instances where it can be clearly demonstrated that there are appreciable performance or cost advantages to be gained and that the overall interests of the Federal Government are best served by granting the requested waiver. Such waiver requests will be reviewed by and are subject to the approval of the Secretary of Commerce. The waiver request must address the criteria stated above as the justification for the waiver.

Forty-five days should be allowed for review and response by the Secretary of Commerce. Waiver requests shall be submitted to the Secretary of Commerce, Washington, D.C. 20230, and labeled as a Request for a Waiver to a Federal Information Processing Standard. No agency shall take any action to deviate from the standard prior to the receipt of a waiver approval from the Secretary of Commerce. No agency shall begin any process of implementation or acquisition of a non-conforming tape label processing facility unless it has already obtained such approval.

13. **Special Information.** While not included as a mandatory part of this standard, attention should be given to Appendix D of ANSI X3.27-1978, "Considerations Associated with Changes and Additions to the Earlier Version" (i.e., X3.27-1969). The information contained in this appendix could be helpful in developing a better understanding of problems usually encountered.

Other standards are being considered or are under development to provide standard labels and file structure for such media as disks and cassettes. When available, they will be reviewed to determine their applicability for adoption as Federal standards.

14. **Where to Obtain Copies.** Copies of this publication are for sale by the National Technical Information Service, U.S. Department of Commerce, Springfield, Virginia 22161. (Sale of the included specifications document is by arrangement with the American National Standards Institute.) When ordering, refer to Federal Information Processing Standards Publication 79 (FIPS-PUB-79), and title. Payment may be made by check, money order, or deposit account.

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