

USA Standard

Perforated Tape Code for Information Interchange

Adopted as a Federal
Information Processing
Standard



FIPS PUB 2-1

See Acceptance Notice
on inside front cover

AMERICAN NATIONAL STANDARD

This standard is one of a number approved as either a USA Standard or an American Standard. It became an American National Standard in October 1969, when the Institute changed its name to American National Standards Institute, Inc.

ANSI 1430 Broadway, New York, N.Y. 10018

This standard has been adopted for Federal Government use.

Details concerning its use within the Federal Government are contained in Federal Information Processing Standards Publication 2-1, Perforated Tape Code for Information Interchange. For a complete list of the publications available in the Federal Information Processing Standards Series, write to the Standards Processing Coordinator (ADP), Institute for Computer Sciences and Technology, National Bureau of Standards, Gaithersburg, MD 20899.

**USA Standard Perforated Tape Code
for Information Interchange**

Sponsor

Business Equipment Manufacturers Association

Approved July 9, 1965

USA Standard

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Foreword

(This Foreword is not a part of the USA Standard Perforated Tape Code for Information Interchange, X3.6-1965.)

This publication represents the standard method of recording the USA Standard Code for Information Interchange, X3.4-1963¹ in perforated tape. It is one of a series of standards relating to information interchange among information processing systems, communication systems and associated equipment.

Other standards will specify the physical, chemical and optical characteristics of the tape. Related standards will deal with machine tool and process control.

The arrangement of the 7 bits in hole tracks was developed by a group of highly qualified and experienced specialists in the use of perforated tape in information processing and communication.

Historical work in the field was considered in the development of this standard.

This standard was approved as American Standard by the American Standards Association on July 9, 1965.²

Suggestions for improvement gained in the use of this standard will be welcome. They should be sent to the USA Standards Institute.

The ASA Sectional Committee on Computers and Information Processing, X3, which developed this standard, had the following personnel at the time of approval:

C. A. Phillips, *Chairman*

V. E. Henriques, *Secretary*

Organization Represented

ASA Sectional Committee on Office Machines, X4
Administrative Management Society
Air Transport Association of America
American Bankers Association
American Gas Association and Edison Electric Institute (*Jointly*)
American Petroleum Institute
Association of American Railroads
Association for Computing Machinery
Business Equipment Manufacturers Association

Council of State Governments
Data Processing Management Association
Electronic Industries Association
Engineers Joint Council
General Services Administration
The Institute of Electrical and Electronics Engineers

Insurance Accounting and Statistical Association
Joint Users Group
Life Office Management Association
National Bureau of Standards
National Machine Tool Builders Association
National Retail Merchants Association
Systems and Procedures Association
Telephone Group
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E. Tomeski
L. W. Claussen
G. L. Bowlby

¹A revised USA Standard Code for Information Interchange was approved in 1967.

²The American Standards Association was reconstituted as the United States of America Standards Institute in August 1966, and American Standards are now designated USA Standards.

The personnel of the X3.2 Subcommittee on Character Sets and Data Format, which developed and processed this standard, was as follows:

L. L. Griffin, <i>Chairman</i>	J. L. Little
O. R. Arne	C. E. Mackenzie
J. F. Auwaerter	C. E. Macon
E. A. Avakian	M. Mendelsohn
T. R. Bousquet	G. L. Murphy
R. M. Brown	J. K. Nelson
E. H. Clamons	H. Spielman
M. R. Dilling	J. E. Taunt
R. M. Gryb	H. Tholstrup
A. H. Hassan	R. E. Utman
R. M. Ireland	E. F. Vidro
W. Y. Lang	A. Whitman
E. J. Lewis	J. Windhorst

The Task Group X3.2.2 on Perforated Tape, which developed the proposal, had the following personnel:

J. F. Auwaerter, <i>Chairman</i>	J. R. Lakin
M. R. Dilling	W. Y. Lang
H. Epstein	B. V. Magee
W. Flieg	W. J. Osterman
R. H. Hunter	C. E. Schultheiss
R. M. Ireland	F. W. Smith
W. J. Kosinski	F. G. Von Kummer

USA Standard Perforated Tape Code for Information Interchange

1. Scope

This standard specifies the representation of the USA Standard Code for Information Interchange, X3.4-1963,¹ in perforated tape and similarly encoded media, used for interchange of information among equipments such as office machines, and information processing and communications apparatus.

2. Arrangement

The perforations shall be arranged in eight longitudinal tracks, one for each of the seven information levels and one for parity. The bits

¹A revised USA Standard Code for Information Interchange was approved in 1967.

of the USA Standard Code shall be assigned to hole tracks as shown in Fig. 1. The character represented by each 8 bit pattern is the character given in the corresponding column and row of the USA Standard Code for Information Interchange, X3.4-1963.¹

3. Parity

A parity bit for each character (vertical parity) shall be part of the perforated tape code. The parity bit shall be recorded in the number 8 track and shall be chosen to provide an even number of code holes for each character.

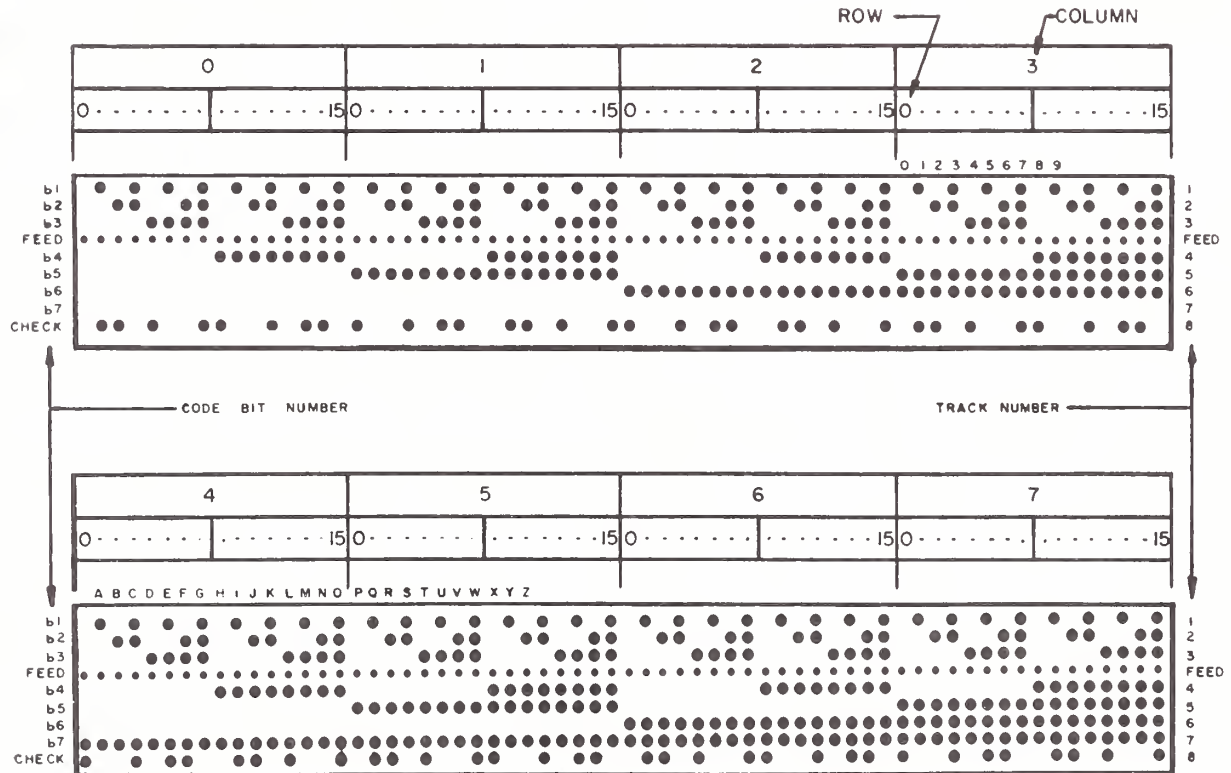


Fig. 1
Perforated Tape Code

NOTE: For character assignments by column and row see USA Standard Code for Information Interchange, X3.4-1963 (see Section 5). The numerical and capital alphabetical characters of the Code are illustrated above for ease of reference.

4. Qualifications

4.1 Deviations from the standard may create serious difficulties in information interchange and should be used only with full cognizance of the parties involved.

4.2 The Appendixes to this standard cover the scope and use of the perforated tape code and specific criteria.

5. Revision of USA Standard Referred to in This Document

When the following USA Standard referred to in this document is superseded by a revision approved by the United States of America Standards Institute, the revision shall apply:

USA Standard Code for Information Interchange, X3.4-1963¹

¹A revised USA Standard Code for Information Interchange was approved in 1967.

Appendixes

(These Appendixes are not a part of USA Standard Perforated Tape Code for Information Interchange, X3.6-1965, but are included to facilitate its use.)

Appendix A Scope and Use of the Perforated Tape Code

A1.1 The Standard Perforated Tape Code is intended for interchange of information among office machines, information processing and communication systems, and associated equipment.

A1.2 This standard does not specify the physical characteristics of the medium in which the code is perforated. Its scope is limited to media such as tape and edge-punched documents perforated by a pattern of holes lying on the intersection of longitudinal and perpendicular transverse center lines spaced approximately

one-tenth of an inch apart. It is normally expected that these media include a sprocket or feed hole track.

A1.3 Work will continue in the following areas (not necessarily listed in order of priority): (1) physical characteristics of the media, (2) tape handling conventions (interchangeable reels, marking and direction of wind, leaders and trailers, etc). (3) marking of tapes (e.g., edge notching) for local control or other purposes.

Appendix B Specific Criteria

B1. Introduction

B1.1 The criteria on which the design of the code was based have not all been entirely satisfied. Some are conflicting, and the choice of code represents an acceptable compromise of those divergent criteria.

B2. Criteria

B2.1 The criteria on which the code is based are summarized below, not necessarily in order of importance:

- (1) The information bits should be grouped in 7 contiguous tracks to simplify operator interpretation of unprinted tapes.
- (2) The information bits should be arranged in (ascending or descending) numerical

order across the tape to simplify operator interpretation of unprinted tapes.

- (3) A single (vertical) parity bit per character offers good protection against characteristic machine errors, and the standard should provide for such redundancy.
- (4) The parity bit should be so placed as to be immutable in contraction or expansion to other code levels.
- (5) The track number of the tape and the bit number of the logical code should be the same in order to minimize maintenance man and operator confusion.
- (6) Any 4-bit subset (consisting of the 4 low order code bits) should be recordable in the low number tracks of the tape. It is desirable that this be done in a manner which can be consistent between 11/16-inch and 1-inch tape.



X3.115-1984 Unformatted 80 Megabyte Trident Pack for Use at 370 tpi and 6000 bpi (General, Physical, and Magnetic Characteristics)

X3.117-1984 Printable/Image Areas for Text and Facsimile Communication Equipment

X3.118-1984 Financial Services — Personal Identification Number — PIN Pad

X3.119-1984 Contact Start/Stop Storage Disk, 158361 Flux Transitions per Track, 8.268 Inch (210 mm) Outer Diameter and 3.937 inch (100 mm) Inner Diameter

X3.120-1984 Contact Start/Stop Storage Disk

X3.121-1985 Two-Sided, Double-Density, Unformatted 5.25-inch (130-mm), 48-tpi (1,9-tpmm), Flexible Disk Cartridge for 7958 bpr Use

X11.1-1977 Programming Language MUMPS

IEEE 416-1978 Abbreviated Test Language for All Systems (ATLAS)

IEEE 716-1982 Standard C/ATLAS Language

IEEE 717-1982 Standard C/ATLAS Syntax

IEEE 770X3.97-1983 Programming Language PASCAL

IEEE 771-1980 Guide to the Use of ATLAS

MIL-STD-1815A-1983 Reference Manual for the Ada Programming Language

X3/TRI-82 Dictionary for Information Processing Systems (Technical Report)

American National Standards for Information Processing

- X3.1-1976** Synchronous Signaling Rates for Data Transmission
X3.2-1970 Print Specifications for Magnetic Ink Character Recognition
X3.4-1977 Code for Information Interchange
X3.5-1970 Flowchart Symbols and Their Usage
X3.6-1965 Perforated Tape Code
X3.9-1978 Programming Language FORTRAN
X3.11-1969 General Purpose Paper Cards
X3.14-1983 Recorded Magnetic Tape (200 CPI, NRZI)
X3.15-1976 Bit Sequencing of the American National Standard Code for Information Interchange in Serial-by-Bit Data Transmission
X3.16-1976 Character Structure and Character Parity Sense for Serial-by-Bit Data Communication in the American National Standard Code for Information Interchange
X3.17-1981 Character Set for Optical Character Recognition (OCR-A)
X3.18-1974 One-Inch Perforated Paper Tape
X3.19-1974 Eleven-Sixteenths-Inch Perforated Paper Tape
X3.20-1967 Take-Up Reels for One-Inch Perforated Tape
X3.21-1967 Rectangular Holes in Twelve-Row Punched Cards
X3.22-1983 Recorded Magnetic Tape (800 CPI, NRZI)
X3.23-1974 Programming Language COBOL
X3.25-1976 Character Structure and Character Parity Sense for Parallel-by-Bit Data Communication in the American National Standard Code for Information Interchange
X3.26-1980 Hollerith Punched Card Code
X3.27-1978 Magnetic Tape Labels and File Structure
X3.28-1976 Procedures for the Use of the Communication Control Characters of American National Standard Code for Information Interchange in Specified Data Communication Links
X3.29-1971 Specifications for Properties of Unpunched Oiled Paper Perforator Tape
X3.30-1971 Representation for Calendar Date and Ordinal Date
X3.31-1973 Structure for the Identification of the Counties of the United States
X3.32-1973 Graphic Representation of the Control Characters of American National Standard Code for Information Interchange
X3.34-1972 Interchange Rolls of Perforated Tape
X3.36-1975 Synchronous High-Speed Data Signaling Rates between Data Terminal Equipment and Data Communication Equipment
X3.37-1980 Programming Language APT
X3.38-1972 Identification of States of the United States (Including the District of Columbia)
X3.39-1973 Recorded Magnetic Tape (1600 CPI, PE)
X3.40-1983 Unrecorded Magnetic Tape (9-Track 800 CPI, NRZI; 1600 CPI, PE; and 6250 CPI, GCR)
X3.41-1974 Code Extension Techniques for Use with the 7-Bit Coded Character Set of American National Standard Code for Information Interchange
X3.42-1975 Representation of Numeric Values in Character Strings
X3.43-1977 Representations of Local Time of the Day
X3.44-1974 Determination of the Performance of Data Communication Systems
X3.45-1982 Character Set for Handprinting
X3.46-1974 Unrecorded Magnetic Six-Disk Pack (General, Physical, and Magnetic Characteristics)
X3.47-1977 Structure for the Identification of Named Populated Places and Related Entities of the States of the United States for Information Interchange
X3.48-1977 Magnetic Tape Cassettes (3.810-mm [0.150-Inch] Tape at 32 bps [800 bpi], PE)
X3.49-1975 Character Set for Optical Character Recognition (OCR-B)
X3.50-1976 Representations for U.S. Customary, SI, and Other Units to Be Used in Systems with Limited Character Sets
X3.51-1975 Representations of Universal Time, Local Time Differentials, and United States Time Zone References
X3.52-1976 Unrecorded Single-Disk Cartridge (Front Loading, 2200 BPI) (General, Physical, and Magnetic Requirements)
X3.53-1976 Programming Language PL/I
X3.54-1976 Recorded Magnetic Tape (6250 CPI, Group Coded Recording)
X3.55-1982 Unrecorded Magnetic Tape Cartridge, 0.250 Inch (6.30 mm), 1600 bpi (63 bps), Phase encoded
X3.56-1977 Recorded Magnetic Tape Cartridge, 4 Track, 0.250 Inch (6.30 mm), 1600 bpi (63 bps), Phase Encoded
X3.57-1977 Structure for Formatting Message Headings Using the American National Standard Code for Information Interchange for Data Communication Systems Control
X3.58-1977 Unrecorded Eleven-Disk Pack (General, Physical, and Magnetic Requirements)
X3.59-1981 Magnetic Tape Cassettes, Dual Track Complementary Return-to-Bias (CRB) Four-States Recording on 3.81-mm (0.150-Inch) Tape
X3.60-1978 Programming Language Minimal BASIC
X3.61-1978 Representation of Geographic Point Locations
X3.62-1979 Paper Used in Optical Character Recognition (OCR) Systems
X3.63-1981 Unrecorded Twelve-Disk Pack (100 Megabytes) (General, Physical, and Magnetic Requirements)
X3.64-1979 Additional Controls for Use with American National Standard Code for Information Interchange
X3.66-1979 Advanced Data Communication Control Procedures (ADCCP)
X3.72-1981 Parallel Recorded Magnetic Tape Cartridge, 4 Track, 0.250 Inch (6.30 mm), 1600 bpi (63 bps), Phase Encoded
X3.73-1980 Single-Sided Unformatted Flexible Disk Cartridge (for 6631-BPR Use)
X3.74-1981 Programming Language PL/I, General-Purpose Subset
X3.76-1981 Unformatted Single-Disk Cartridge (Top Loading, 200 tpi 4400 bpi) (General, Physical, and Magnetic Requirements)
X3.77-1980 Representation of Pocket Select Characters
X3.78-1981 Representation of Vertical Carriage Positioning Characters in Information Interchange
X3.79-1981 Determination of Performance of Data Communications Systems That Use Bit-Oriented Communication Procedures
X3.80-1981 Interfaces between Flexible Disk Cartridge Drives and Their Host Controllers
X3.82-1980 One-Sided Single-Density Unformatted 5.25-Inch Flexible Disk Cartridge (for 3979-BPR Use)
X3.83-1980 ANSI Sponsorship Procedures for ISO Registration According to ISO 2375
X3.84-1981 Unformatted Twelve-Disk Pack (200 Megabytes) (General, Physical, and Magnetic Requirements)
X3.85-1981 1/2-Inch Magnetic Tape Interchange Using a Self Loading Cartridge
X3.86-1980 Optical Character Recognition (OCR) Inks
X3.88-1981 Computer Program Abstracts
X3.89-1981 Unrecorded Single-Disk, Double-Density Cartridge (Front Loading, 2200 bpi, 200 tpi) (General, Physical, and Magnetic Requirements)
X3.91M-1982 Storage Module Interfaces
X3.92-1981 Data Encryption Algorithm
X3.93M-1981 OCR Character Positioning
X3.95-1982 Microprocessors — Hexadecimal Input/Output, Using 5-Bit and 7-Bit Teleprinters
X3.96-1983 Continuous Business Forms (Single-Part)
X3.98-1983 Text Information Interchange in Page Image Format (PIF)
X3.99-1983 Print Quality Guideline for Optical Character Recognition (OCR)
X3.100-1983 Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment for Packet Mode Operation with Packet Switched Data Communications Network
X3.101-1984 Interfaces Between Rigid Disk Drive(s) and Host(s)
X3.102-1983 Data Communication Systems and Services — User-Oriented Performance Parameters
X3.103-1983 Unrecorded Magnetic Tape Minicassette for Information Interchange, Coplanar 3.81 mm (0.150 in)
X3.104-1983 Recorded Magnetic Tape Minicassette for Information Interchange, Coplanar 3.81 mm (0.150 in), Phase Encoded
X3.105-1983 Data Link Encryption
X3.106-1983 Modes of Operation for the Data Encryption Algorithm
X3.110-1983 Videotex/Teletext Presentation Level Protocol Syntax
X3.112-1984 14-in (356-mm) Diameter Low-Surface-Friction Magnetic Storage Disk
X3.114-1984 Alphanumeric Machines: Coded Character Sets for Keyboard Arrangements in ANSI X4.23-1982 and X4.22-1983

(continued on reverse)