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American National Standard

representations of local time of the day for information interchange

Adopted for Use by
the Federal Government



FIPS PUB 58
See Notice on Inside
Front Cover

X3.43-1977



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American National Standard Representations of Local Time of the Day for Information Interchange

Secretariat

Computer and Business Equipment Manufacturers Association

Approved November 29, 1976

American National Standards Institute, Inc

American National Standard

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Foreword

(This Foreword is not a part of American National Standard Representations of Local Time of the Day for Information Interchange, X3.43-1977.)

Suggestions for improvement of this standard will be welcome. They should be sent to the American National Standards Institute, 1430 Broadway, New York, N.Y. 10018.

This standard was processed and approved for submittal to ANSI by American National Standards Committee on Computers and Information Processing, X3. Committee approval of the standard does not necessarily imply that all committee members voted for its approval. At the time it approved this standard, the X3 Committee had the following members:

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American National Standard Representations of Local Time of the Day for Information Interchange

1. General

1.1 Scope. This standard is designed to establish uniform time representations based upon both the 12- and 24-hour timekeeping systems. It provides a means for representing local time of the day in digital form for the purpose of interchanging information among data systems. Specifically, it is intended to:

- (1) Reduce the time required to record or format the elements of local time of the day expressions and transmit them
- (2) Improve clarity and accuracy of interchange
- (3) Minimize the amount of human intervention required for communicating local time of the day expression
- (4) Reduce costs
- (5) Provide a convenient and efficient way for machines and humans to distinguish between time representations in the 12- and 24-hour timekeeping systems.

1.2 Qualifications. This standard does not prescribe file sequences, storage media, programming languages, or other features of information processing to be used in its implementation. The use of this standard to represent local time of the day expressions does not ensure that the time of the day represented is accurate.

1.3 Related Standard. American National Standard Representation for Calendar Date and Ordinal Date for Information Interchange, X3.30-1971, can be used in combination with this standard for representing date-time groups (see Section 4).

2. Specifications

2.1 Representations for Local Time of the Day. Local time of the day is defined as civil clock time at the point of origin. In both the 12- and 24-hour timekeeping systems, local time of the day may be expressed by the following combinations of the time elements hours, minutes, and seconds:

- (1) Hours
- (2) Hours and decimal fraction of an hour

- (3) Hours and minutes
- (4) Hours, minutes, and decimal fraction of a minute
- (5) Hours, minutes, and seconds
- (6) Hours, minutes, seconds, and decimal fraction of a second

Expressions for local time of the day in the 12-hour timekeeping system must additionally include a meridiem designator as defined in 2.7.

2.2 Sequencing of Time Elements. The sequencing of time elements shall be from high order to low order (left to right): hour, minute, second. When a decimal fraction of an element is specified, no lower-order element may be included in the expression. For example, an expression containing a decimal fraction of an hour cannot also include the element(s) minutes or seconds, or a combination thereof.

The meridiem designator required for expression in the 12-hour timekeeping system is always positioned as the extreme-lowest-order (rightmost) character in the representation.

2.3 Use of Separators. No separators are required in time representations other than the decimal point (period) used as described in 2.4 and 2.5. A colon may be used as a separator between the time elements of hours, minutes, and seconds to improve human visual understanding. No separator is permitted between the least-significant time element and the meridiem designator in representations of 12-hour clock times.

2.4 Representation of Hours. In the 24-hour timekeeping system, the hour shall be represented by a two-digit decimal number ranging from 00 through 23, beginning with 00 and continuing in series: 01, 02, . . . , 23.¹ In the 12-hour timekeeping system the hour shall be represented by a two-digit decimal number ranging from 01 through 12, beginning with 12 and continuing in series: 01, 02, . . . , 11. When a decimal fraction of an hour is specified, it shall be separated from the hour representation by a decimal point (period) and ex-

¹ When midnight is defined to be the end of a day, the hour may be represented as 24. See 2.8.

pressed numerically to the precision (number of decimal places) desired.

2.5 Representation of Minutes. In both the 12- and 24-hour timekeeping systems, the minute shall be represented by a two-digit decimal number ranging from 00 through 59. When a decimal fraction of a minute is specified, it shall be separated from the minute representation by a decimal point (period) and expressed numerically to the precision (number of decimal places) desired.

2.6 Representation of Seconds. In both the 12- and 24-hour timekeeping systems, the second shall be represented by a two-digit decimal number ranging from 00 through 59. When a decimal fraction of a second is specified, it shall be separated from the second representation by a decimal point (period) and expressed numerically to the precision (number of decimal places) desired.

2.7 Representation of Meridiem Designator. The meridiem designator, required in 12-hour clock expressions of time, shall be represented by a single uppercase alphabetic character in the low-order (right-hand) position of the expression: "A" shall represent ante meridiem (or a.m.) and is appended to all 12-hour clock times from and including midnight up to and excluding noon. "P" shall represent post meridiem (or p.m.) and is appended to all 12-hour clock times from and including noon up to and excluding midnight.

2.8 Representation of Midnight and Noon. Midnight in the 24-hour timekeeping system is represented in hours, minutes, and seconds as "000000" (the start of a day) or as "240000" (the end of a day). The 1-second time sequences shown in Table 1 are provided for purposes of illustration.

Table 1
Representation of Midnight and Noon in 24-Hour Timekeeping System

Date and Time	Representation
1975 December 31 (two seconds to midnight)	19751231-235958
1975 December 31 (one second to midnight)	19751231-235959
1976 January 1	(Start of new day and year) 19760101-000000
or	or
1975 December 31 (midnight)	(End of day and year) 19751231-240000
1976 January 1 (one second past midnight)	19760101-000001

Table 2
Representation of Time in 24- and 12-Hour Timekeeping Systems

Expression	Representation	
	24-hour	12-hour
Hours	14	02P
Hours and decimal fraction of an hour	14.21	02.21P
Hours and minutes (with separators)	1412 14:12	0212P 02:12P
Hours, minutes, and decimal fraction of a minute (with separators)	1412.6 14:12.6	0212.6P 02:12.6P
Hours, minutes and seconds (with separators)	141236 14:12:36	021236P 02:12:36P
Hours, minutes, seconds and decimal fraction of a second (with separators)	141236.0 14:12:36.0	021236.0P 02:12:36.0P

Midnight in the 12-hour timekeeping system is represented in hours, minutes, seconds, and meridiem designation as "120000A."

Noon in the 24-hour timekeeping system is represented in hours, minutes, and seconds as "120000."

Noon in the 12-hour timekeeping system is represented in hours, minutes, seconds, and meridiem designation as "120000P."

3. Examples

The time of 12 minutes, 36 seconds past 2 o'clock p.m. locally is represented by examples shown in Table 2.

4. Combinations of Date and Time Representation

This standard is designed to be used in combination with American National Standard Representation for Calendar Date and Ordinal Date for Information Interchange, X3.30-1971. High-order to low-order sequence must be maintained, that is, year, month, day, hour, minute, second. Separators are not required and consequently should not be used to separate date and time for interchange among data processing systems; however, if separators are required to facilitate human understanding, a hyphen or a space may be used to

separate the low-order element of the date and high-order element of the time. The time representation, "141236," combined with the calendar date, "1971-09-01," is represented as "19710901141236," or with a hyphen separating date and time as "19710901-141236."

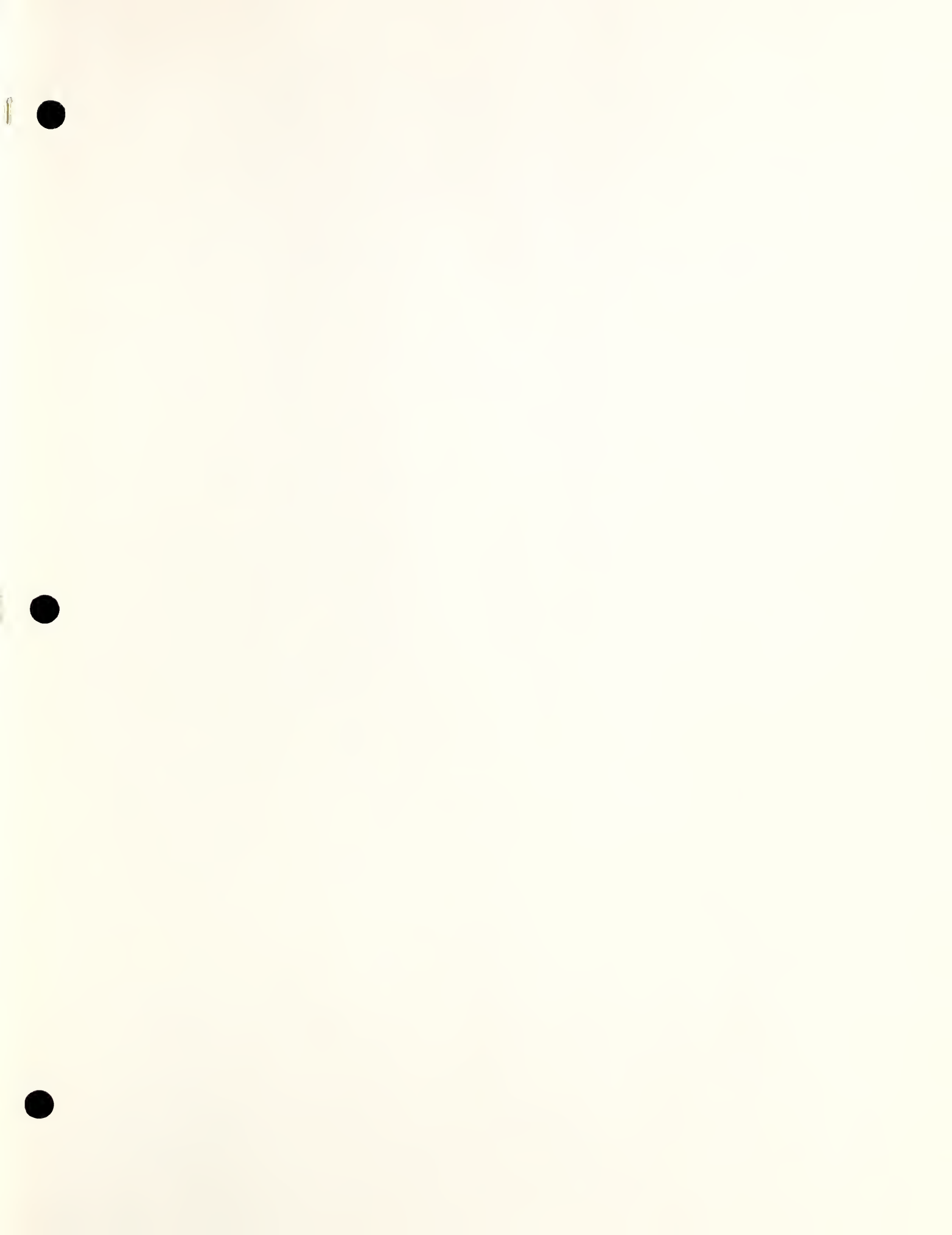
5. Application

Depending upon the degree of specificity required by various applications in representing time, the number of time elements used may vary. For example, some applications need the hour only; others need the hour and minute; others the hour, minute, and second; and others the hour, minute, second, and decimal fraction of a second. In addition, the number of characters used to represent decimal fractions of time elements will vary depending on application

requirements. Also, whether the 12- or 24-hour timekeeping system is used, the method for representing midnight will vary depending upon application requirements. Accordingly, there must be an understanding between the sender and recipient of time representations as to the specific structure used. This is generally accomplished by adequate definition in format or record descriptions.

When exchanging data on an international basis, it is recommended that only the 24-hour timekeeping system representations be used and that midnight be represented as "000000." This is in accordance with the provisions of ISO Standard 3307-1975, Information Interchange – Representations of Time of the Day.²

²Publications of the International Organization for Standardization are available from the American National Standards Institute, 1430 Broadway, New York, N.Y. 10018.



American National Standards on Computers and Information Processing

- X3.1-1976** Synchronous Signaling Rates for Data Transmission
- X3.2-1970 (R1976)** Print Specifications for Magnetic Ink Character Recognition
- X3.3-1970 (R1976)** Bank Check Specifications for Magnetic Ink Character Recognition
- X3.4-1977** Code for Information Interchange
- X3.5-1970** Flowchart Symbols and Their Usage in Information Processing
- X3.6-1965 (R1973)** Perforated Tape Code for Information Interchange
- X3.9-1978** FORTRAN
- X3.11-1969** Specification for General Purpose Paper Cards for Information Processing
- X3.14-1973** Recorded Magnetic Tape for Information Interchange (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
- X3.17-1977** Character Set and Print Quality for Optical Character Recognition (OCR-A)
- X3.18-1974** One-Inch Perforated Paper Tape for Information Interchange
- X3.19-1974** Eleven-Sixteenths-Inch Perforated Paper Tape for Information Interchange
- X3.20-1967 (R1974)** Take-Up Reels for One-Inch Perforated Tape for Information Interchange
- X3.21-1967** Rectangular Holes in Twelve-Row Punched Cards
- X3.22-1973** Recorded Magnetic Tape for Information Interchange (800 CPI, NRZI)
- X3.23-1974** Programming Language COBOL
- X3.24-1968** Signal Quality at Interface between Data Processing Terminal Equipment and Synchronous Data Communication Equipment for Serial Data Transmission
- X3.25-1976** Character Structure and Character Parity Sense for Parallel-by-Bit Communication in the American National Standard Code for Information Interchange
- X3.26-1970** Hollerith Punched Card Code
- X3.27-1978** Magnetic Tape Labels and File Structure for Information Interchange
- 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 for Information Interchange
- X3.31-1973** Structure for the Identification of the Counties of the United States for Information Interchange
- 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 for Information Interchange
- X3.36-1975** Synchronous High-Speed Data Signaling Rates between Data Terminal Equipment and Data Communication Equipment
- X3.37-1977** Programming Language APT
- X3.38-1972** Identification of States of the United States (Including the District of Columbia) for Information Interchange
- X3.39-1973** Recorded Magnetic Tape for Information Interchange (1600 CPI, PE)
- X3.40-1976** Unrecorded Magnetic Tape for Information Interchange (9-Track 200 and 800 CPI, NRZI, and 1600 CPI, PE)
- 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 for Information Interchange
- X3.43-1977** Representations of Local Time of the Day for Information Interchange
- X3.44-1974** Determination of the Performance of Data Communication Systems
- X3.45-1974** 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 for Information Interchange (3.810-mm [0.150-in] Tape at 32 bpmm [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 for Information Interchange
- 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 for Information Interchange (6250 CPI, Group Coded Recording)
- X3.55-1977** Unrecorded Magnetic Tape Cartridge for Information Interchange, 0.250 Inch (6.30 mm), 1600 bpi (63 bpmm), Phase Encoded
- X3.56-1977** Recorded Magnetic Tape Cartridge for Information Interchange 4 Track, 0.250 Inch (6.30 mm), 1600 bpi (63 bpmm), Phase Encoded
- X3.57-1977** Structure for Formatting Message Headings for Information Interchange Using the American National Standard Code for Information Interchange for Data Communication System Control
- X3.58-1977** Unrecorded Eleven-Disk Pack General, Physical, and Magnetic Requirements
- X3.60-1978** Minimal BASIC
-
- X3/TRI-77** Dictionary for Information Processing (Technical Report)