American National Standard

for information systems –

representations of local time of day for information interchange

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 58-1, Representations of Local Time of Day 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.

American National Standard
for Information Systems –

Representations of Local Time of Day
for Information Interchange

Secretariat

Computer and Business Equipment Manufacturers Association

Approved June 23, 1986

American National Standards Institute, Inc

American National Standard

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Foreword

This standard is a revision of American National Standard Representations of Local Time of Day for Information Interchange, ANSI X3.43-1977. It is designed to establish uniform time representations based on both the 12- and 24-hour timekeeping systems by providing a means for representing local time of the day in digital form for the purpose of interchanging information among data systems.

Suggestions for the improvement of this standard will be welcome. They should be sent to the Computer and Business Equipment Manufacturers Association, 311 First Street, NW, Suite 500, Washington, DC 20001.

This standard was processed and approved for submittal to ANSI by Accredited Standards Committee on Information Processing Systems, X3. Committee approval of the standard does not necessarily imply that all 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 for Information Systems –

Representations of Local Time of 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 Representation of Date–Time Groups. American National Standard Representation for Calendar Date and Ordinal Date for Information Interchange, ANSI X3.30-1971, and American National Standard for Information Systems – Representations of Universal Time, Local Time Differentials, and United States Time Zone References for Information Interchange, ANSI X3.51-1986, can be used in combination with this standard for representing date–time groups.

2. Related Standards

The following standards are intended to be used solely for explanation or clarification:

2.1 American National Standards

ANSI X3.30-1971 (R1985), Representation for Calendar Date and Ordinal Date for Information Interchange

ANSI X3.51-1986, Information Systems – Representations of Universal Time, Local Time Differentials, and United States Time Zone References for Information Interchange

2.2 Other Standards

International Standard for Information Interchange – Representations of Time of the Day, ISO 3307-1975[1]

3. Specifications

3.1 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

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[1] Available from the American National Standards Institute, 1430 Broadway, New York, NY 10018.

(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 3.7.

3.2 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.

3.3 Use of Separators. No separators are required in time representations other than the decimal point (period) used as described in 3.4 and 3.5. 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.

3.4 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.[2] 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 expressed numerically to the precision (number of decimal places) desired.

3.5 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.

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[2] When midnight is defined to be the end of a day, the hour may be represented as 24. See 3.8.

Table 1
Representation of Midnight in a
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 (midnight)	19760101-000000 (Start of new day and year)
or	or
1975 December 31 (midnight)	19751231-240000 (End of day and year)
1976 January 1 (one second past midnight)	19760101-000001

3.6 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.

3.7 Representation of Meridiem Designator. The meridiem designator, required in 12-hour clock expressions of time, shall be represented by a single upper-case 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.

3.8 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.

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."

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

	Representation	
	Timekeeping System	
Expression	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

4. Examples

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

5. Combinations of Date and Time Representation

This standard is designed to be used in combination with ANSI 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."

6. 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 3307-1975.[1]

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

X3.116-1986 Recorded Magnetic Tape Cartridge, 4-Track, Serial 0.250 Inch (6.30 mm) 6400 bpi (252 bpmm), Inverted Modified Frequency Modulation Encoded

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

X3.121-1984 Two-Sided, Unformatted, 8-Inch (200-mm), 48-tpi, Double-Density, Flexible Disk Cartridge for 13 262 ftpr Two-Headed Application

X3.122-1986 Computer Graphics Metafile for the Storage and Transfer of Picture Description Information

X3.124-1985 Graphical Kernel System (GKS) Functional Description

X3.124.1-1985 Graphical Kernel System (GKS) FORTRAN Binding

X3.125-1985 Two-Sided, Double-Density, Unformatted 5.25-inch (130-mm), 48-tpi (1,9-tpmm), Flexible Disk Cartridge for 7958 bpr Use

X3.126-1986 One- or Two-Sided Double-Density Unformatted 5.25-inch (130-mm), 96 Tracks per Inch, Flexible Disk Cartridge

X3.127-1987 Unrecorded Magnetic Tape Cartridge for Information Interchange

X3.128-1986 Contact Start-Stop Storage Disk — 83 000 Flux Transitions per Track, 130-mm (5.118-in) Outer Diameter and 40-mm (1.575-in) Inner Diameter

X3.129-1986 Intelligent Peripheral Interface, Physical Level

X3.130-1986 Intelligent Peripheral Interface, Logical Device Specific Command Sets for Magnetic Disk Drive

X3.131-1986 Small Computer Systems Interface

X3.132-1987 Intelligent Peripheral Interface — Logical Device Generic Command Set for Optical and Magnetic Disks

X3.133-1986 Database Language —NDL

X3.135-1986 Database Language — SQL

X3.136-1986 Serial Recorded Magnetic Tape Cartridge for Information Interchange, Four and Nine Track

X3.139-1987 Fiber Distributed Data Interface (FDDI) Token Ring Media Access Control (MAC)

X3.140-1986 Open Systems Interconnection — Connection Oriented Transport Layer Protocol Specification

X3.141-1987 Data Communication Systems and Services — Measurement Methods for User-Oriented Performance Evaluation

X3.146-1987 Device Level Interface for Streaming Cartridge and Cassette Tape Drives

X3.147-1988 Intelligent Peripheral Interface — Logical Device Generic Command Set for Magnetic Tapes

X3.153-1987 Open Systems Interconnection — Basic Connection Oriented Session Protocol Specification

X3.156-1987 Nominal 8-Inch Rigid Disk Removable Cartridge

X3.157-1987 Recorded Magnetic Tape for Information Interchange, 3200 CPI

X3.158-1987 Serial Recorded Magnetic Tape Cassette for Information Interchange, 0.150 Inch (3.81 mm), 8000 bpi (315 bpmm), Group Code Recording.

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

ISO 8211-1986 Specifications for a Data Descriptive File for Information Interchange

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

NBS-ICST 1-1986 Fingerprint Identification — Data Format for Information Interchange

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

American National Standards for Information Processing

X3.1-1987 Synchronous Signaling Rates for Data Transmission

X3.2-1970 Print Specifications for Magnetic Ink Character Recognition

X3.4-1986 Coded Character Sets — 7-Bit ASCII

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)

X3.23-1985 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

X3.27-1987 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

X3.30-1986 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

X3.37-1987 Programming Language APT

X3.38-1972 Identification of States of the United States (Including the District of Columbia)

X3.39-1986 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

X3.43-1986 Representations of Local Time of 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

X3.48-1986 Magnetic Tape Cassettes (3.81-mm [0.150-Inch] Tape at 32 bpmm [800 bpi], PE)

X3.49-1975 Character Set for Optical Character Recognition (OCR-B)

X3.50-1986 Representations for U.S. Customary, SI, and Other Units to Be Used in Systems with Limited Character Sets

X3.51-1986 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

X3.54-1986 Recorded Magnetic Tape (6250 CPI, Group Coded Recording)

X3.55-1982 Unrecorded Magnetic Tape Cartridge, 0.250 Inch (6.30 mm), 1600 bpi (63 bpmm), Phase encoded

X3.56-1986 Recorded Magnetic Tape Cartridge, 4 Track, 0.250 Inch (6.30 mm), 1600 bpi (63 bpmm), 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)

X3.60-1978 Programming Language Minimal BASIC

X3.61-1986 Representation of Geographic Point Locations

X3.62-1987 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 bpmm), Phase Encoded

X3.73-1980 Single-Sided Unformatted Flexible Disk Cartridge (for 6631-BPR Use)

X3.74-1987 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-1987 Storage Module Interfaces

X3.92-1981 Data Encryption Algorithm

X3.93M-1981 OCR Character Positioning

X3.94-1985 Programming Language PANCM

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

X3.111-1986 Optical Character Recognition (OCR) Matrix Character Sets for OCR-M

X3.112-1984 14-in (356-mm) Diameter Low-Surface-Friction Magnetic Storage Disk

X3.113-1987 Programming Language FULL BASIC

X3.114-1984 Alphanumeric Machines; Coded Character Sets for Keyboard Arrangements in ANSI X4.23-1982 and X4.22-1983