

EXHIBIT E

IEEE Std 100-1996

The IEEE Standard
Dictionary of Electrical
and Electronics Terms

OFFICIAL VERTICAL TITLE AND COVER LETTERS FOR THE IEEE STANDARD DICTIONARY OF ELECTRICAL AND ELECTRONICS TERMS

Sixth Edition



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The IEEE Standard Dictionary of Electrical and Electronics Terms

Sixth Edition

Standards Coordinating Committee 10, Terms and Definitions
Jane Radatz, Chair

This standard is one of a number of information technology dictionaries being developed by standards organizations accredited by the American National Standards Institute. This dictionary was developed under the sponsorship of voluntary standards organizations, using a consensus-based process.

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Introduction

Since the first edition in 1941 of the American Standard Definitions of Electrical Terms, the work now known as IEEE Std 100, The IEEE Standard Dictionary of Electrical and Electronics Terms, has evolved into the unique compendium of terms that it is today.

The current edition includes all terms defined in approved IEEE standards through December 1996. Terms are categorized by their technical subject area. They are also associated with the standards or publications in which they currently appear. In some cases, terms from withdrawn standards are included when no current source can be found. Earlier editions of IEEE Std 100 included terms from sources other than IEEE standards, such as technical journals, books, or conference proceedings. These terms have been maintained for the sake of consistency and their sources are listed with the standards in the back of the book.

The practice of defining terms varies from standard to standard. Many working groups that write standards prefer to work with existing definitions, while others choose to write their own. Thus terms may have several similar, although not identical, definitions. Definitions have been combined wherever it has been possible to do so by making only minor editorial changes. Otherwise, they have been left as written in the original standard.

Users of IEEE Std 100 occasionally comment on the surprising omission of a particular term commonly used in an electrical or electronics field. This occurs because the terms in IEEE Std 100 represent only those defined in the existing or past body of IEEE standards. To respond to this, some working groups obtain authorization to create a glossary of terms used in their field. All existing, approved standard glossaries have been incorporated into this edition of IEEE Std 100, including the most current glossaries of terms for computers and power engineering.

IEEE working groups are encouraged to refer to IEEE Std 100 when developing new or revised standards to avoid redundancy. They are also encouraged to investigate deficiencies in standard terms and create standard glossaries to alleviate them.

The sponsoring body for this document was Standards Coordinating Committee 10 on Definitions (SCC10), which consisted of the following members:

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time difference (navigation aids) (loran) The difference in the time of reception of the two signals of a loran rate.

(AE) 172-1983w

time discriminator (electronic navigation) A circuit in which the sense and magnitude of the output is a function of the time difference of the occurrence, and relative time sequence, of two pulses. *See also:* navigation.

(AE) [42], 686-1982s

time distortion (broadband local area networks) Time distortion (group delay) is the difference in transmission time between frequencies of a service. The broadband service usually resides in a single channel, but the delay distortion may be specified over a bandwidth that is different than the bandwidth of the channel. Video specifies the time delay distortion to be less than a channel bandwidth. Video channels (6 MHz) normally specify the group delay between the video and color carriers (3.58 MHz). The delay distortion in video services may influence color rendition. In data services, group delay may influence the bit error rate. The specification for group delay must always be applied across a referenced bandwidth to be valid. This distortion is most prominent at the frequency band-edges of a diplex filter, but may also be observed in band-pass, band-stop, and equalizing filters.

(C/LM) 802.7-1989

time distribution analyzer (nuclear techniques) An instrument capable of indicating the number or rate of occurrence of time intervals falling within one or more specified time interval ranges. The time interval is delineated by the separation between pulses of a pulse pair. *See also:* ionizing radiation.

(NPS) 175-1960w

time-division analog switching (telephone switching systems) Analog switching with common time-divided paths for simultaneous calls.

(COM) 312-1977w

time-division digital switching (telephone switching systems) Digital switching with common time-divided paths for simultaneous calls.

(COM) 312-1977w

time division multiple access (TDMA) (1) (communication satellite) A technique whereby earth stations communicate with each other on the basis of non-overlapping time sequenced bursts of transmissions through a common satellite repeater.

(COM) [19]

(2) A multiplexing technique in which a channel is divided among different users allocating to each of them a time slot in a repeating cycle.

(C) 610.7-1995

time-division multiplex (data transmission) The process or device in which each modulating wave modulates a separate pulse subcarrier, the pulse subcarriers being spaced in time so that no two pulses occupy the same time interval. *Note:* Time division permits the transmission of two or more signals over a common path by using different time intervals for the transmission of the intelligence of each message signal.

(AP/PE) 145-1983s, 599-1985w

time-division multiplexing (TDM) (1) Sharing a communication channel among several users by allowing each to use the channel for a given period of time in a defined, repeated sequence.

(C/LM) 802.7-1989

(2) A method by which two or more channels of information are transmitted over the same link by allocating a different time interval for the transmission of each channel. *See also:* synchronous time division multiplexing; wave-division multiplexing.

(C) 610.7-1995

time division multiplexing bus switching A method of time division switching in which time slots are used to transfer data over a shared bus between transmitter and receiver.

(C) 610.7-1995

time division switching (1) The switching of inputs to outputs using time-division multiplexing techniques. *See also:* time division multiplexing bus switching.

(C) 610.7-1995

(2) A method of switching that provides a common path with separate time intervals assigned to each of the simultaneous calls.

(COM) 312-1977w

time domain calibration A result which is the impulse response function of the sensor or probe in the time domain.

(EMC) 1309-1996

time domain reflectometer (TDR) (1) Test equipment that verifies proper functioning of the physical components of the network with a sequence of time-delayed electrical pulses.

(C) 610.7-1995

(2) *See also:* reflectometer, time-domain.

timed release (telephone switching systems) Release accomplished after a specified delay.

(COM) 312-1977w

time, electrification (cable-insulation materials) Time during which a steady direct voltage is applied to electrical insulating materials before the current is measured.

(PE) 402-1974w

time error Power system time minus a reference time. This quantity is derived by integrating frequency error over time and dividing it by rated frequency.

(PE) 858-1993, 94-1991

time error bias An offset of the scheduled net interchange of a control area that varies in proportion to time error and that assists in restoring time error to zero.

(PE) 858-1993, 94-1991

time gain control *See:* differential gain-control circuit.

time gate A transducer that gives output only during chosen time intervals.

(AP) 145-1983s

time history (1) (gas-insulated substations) The trace of acceleration, velocity, or displacement as a function of time that the ground, the floor of a building, or a point of support experiences due to an earthquake.

(PE/SWG/SUB) C37.100-1992, C37.122-1983s

(2) (mechanical) The record of acceleration, velocity, or displacement as a function of time which the floor of a building or the ground experiences due to an earthquake.

(PE/SUB) 693-1984r, C37.122.1-1993

time-interval selector (nuclear techniques) A circuit that produces a specified output pulse when and only when the time interval between two pulses lies between specified limits. *See also:* scintillation counter.

(NPS) 175-1960w

time-interval simulation *See:* time-slice simulation.

time-invariant filtering (germanium gamma-ray detectors) Pulse shaping in which the filter response does not change with respect to time. [CR-(RC)ⁿ shaping is an example of time-invariant filtering.]

(NPS) 325-1986s

time lag *See:* lag.

time lag of impulse flashover (surge arresters) The time between the instant when the voltage of the impulse wave first exceeds the power-frequency flashover crest voltage and the instant when the impulse flashover causes the abrupt drop in the testing wave.

(PE/T&D) [10], [8]

time-load withstand strength (of an insulator) The mechanical load that, under specified conditions, can be continuously applied without mechanical or electrical failure. *See also:* insulator.

(EEC) [89]

time locking A method of locking, either mechanical or electric, that, after a signal has been caused to display an aspect to proceed, prevents, until after the expiration of a predetermined time interval after such signal has been caused to display its most restrictive aspect, the operation of any interlocked or electrically locked switch, movable-point frog, or derail in the route governed by that signal, and that prevents an aspect to proceed from being displayed for any conflicting route. *See also:* interlocking.

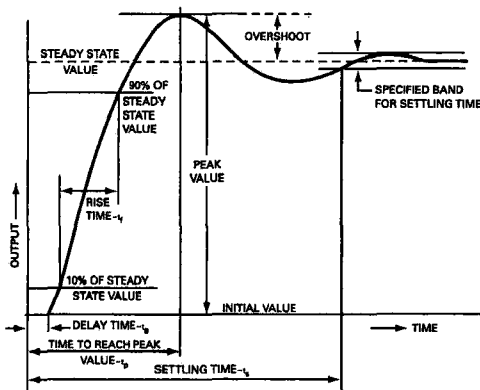
(EEC/PE) [119]

time meridian (navigation aids) Any meridian used as a reference for reckoning time, particularly a zone.

(AE) 172-1983w

time-multiplexed bus A bus which uses time-division multiplexing techniques to share its data paths between a number of devices.

(C) 610.10-1994



[Typical time response of a feedback control system to a step change in input.]

time response

(PE) 421A-1978s

(3) **(synchronous-machine regulator)** The output of the synchronous-machine regulator (that is, voltage, current, impedance, or position) expressed as a function of time following the application of prescribed inputs under specified conditions.

(PE) 421A-1978s

time, response *See*: response time.

time rise tone (measuring the performance of tone address signaling systems) The time interval between the end of the tone off condition and the beginning of the tone present condition at the beginning of the tone under consideration.

(COM) 752-1986r

timer overrun (1) A condition that occurs each time a timer, for which there is already an expiration signal queued to the process, expires.

(C/PA) 9945-1-1996

(2) A condition that occurs each time a timer for which there is already an expiration signal queued to the process expires.

(C/PA) 1003.5b-1995

time scale *See*: time.

time sharing (software) A mode of operation that permits two or more users to execute computer programs concurrently on the same computer system by interleaving the execution of their program. *Note*: Time sharing may be implemented by time slicing, priority-based interrupts, or other scheduling methods.

(C) 610.10-1994, 610.12-1990

time signal (navigation aids) An accurate signal marking a specified time or time interval.

(AE) 172-1983w

time skew (1) **(analog-to-digital converter)** In an analog to digital conversion process, the time difference between the conversion of one analog channel and any other analog channel, such that the converted (digital) representations of the analog signals do not correspond to values of the analog variables that existed at the same instant of time. Time skew is eliminated, where necessary, by the use of a multiplexor with a sample/hold feature, allowing all input channels to be simultaneously sampled and stored for later conversion. *See also*: analog-to-digital converter; switching time.

(C) 165-1977w, 166-1977w

(2) (A) In a conversion from analog to digital, the time difference between the conversion of one analog channel and any other analog channel, such that the converted (digital) representations of the analog signals do not correspond to values of the analog variables that existed at the same instant of time. (B) The time interval between two events which are intended to be simultaneous.

(C) 610.10-1994

time-slice simulation (A) A discrete simulation that is terminated after a specific amount of time has elapsed; for example, a model depicting the year-by-year forces affecting a volcanic eruption over a period of 100 000 years. *Synonym*: time-interval simulation. *See also*: critical event simulation. (B) A discrete simulation of continuous events in which time advances by intervals chosen independent of the simulated events; for example, a model of a time multiplexed commu-

nication system with multiple channels transmitting signals over a single transmission line in very rapid succession.

(C) 610.3-1989

time slicing A mode of operation in which two or more processes are each assigned a small, fixed amount of continuous processing time on the same processor, and the processes execute in a round-robin manner, each for its allotted time, until all are completed.

(C) 610.12-1990

time slot (1) In time division multiplexing, when time is divided into slots to route data from input to output.

(C) 610.7-1995

(2) Any cyclic time interval that can be recognized and defined uniquely.

(COM) 1007-1991

time sorter *See*: time distribution analyzer.

time-to-amplitude converter (scintillation counting) An instrument producing an output pulse whose amplitude is proportional to the time difference between start and stop pulses.

(NPS) 398-1972r

time to chopping (switching impulse testing) The time interval T_c between actual zero and the instant when the chopping occurs.

332-1972w

time to crest The time interval T_{cr} between actual zero and the instant when the voltage has reached its crest value.

332-1972w

time-to-crest value (T_c) The time that an impulse rises to crest value.

(C/PE) 1313.1-1996

time to first voltage zero on the tail of the wave The time interval from the start of the transient to the time when the first voltage zero occurs on the tail of the wave.

(PE) C57.12.90-1993

time to half value (1) The time interval T_h between actual zero and the instant on the tail when the impulse has decreased to half its crest value.

(Std100) 332-1972w

(2) The time that an impulse drops to 0.5 crest value.

(C/PE) 1313.1-1996

time to half-value on the wavetail *See*: virtual time to half-value.

time to impulse flashover The time between the initial point of the voltage impulse causing flashover and the point at which the abrupt drop in the voltage impulse takes place.

(PE/T&D) [10]

time-to-impulse sparkover The time between virtual zero of the voltage impulse causing sparkover and the point on the voltage wave at which sparkover occurs.

(PE/PSPD) C62.1-1981s, C62.11-1993

time-to-saturation The time during which the secondary current is a faithful replica of the primary current. *Note*: The core does not saturate suddenly. Beyond the saturation flux level, the exciting current increases more rapidly than the secondary current, causing distortion in the secondary waveform.

(PE) C37.110-1996

time, turn-around (test, measurement, and diagnostic equipment) The time needed to service or check out an item for recommitment.

(ML) [2]

time-undervoltage protection A form of undervoltage protection that disconnects the protected equipment upon a deficiency of voltage after a predetermined time interval.

(PE/SWG) C37.100-1992

time update (sequential events recording systems) The correction or resetting of a real time clock to match a time standard. *See also*: real time.

(PE) [1], [5]

time variable A variable whose value represents simulated time or the state of the simulation clock.

(C) 610.3-1989

time-variant filtering Pulse shaping in which the filter response varies with time.

(NPS) 325-1996

time zone diversity Load diversity between two or more electric systems that occurs when their peak loads are in different time zones.

(PE) 858-1993

timing accuracy The maximum timing error allowable in message accounting records. Different tolerances may be required for recording time of day and for call duration. Time of day

COBOL 85 A dialect of COBOL; developed as a standard language in 1985, and standardized by IEEE, ISO, and ANSI.

(C) 610.13-1993

co-channel interference Interference caused in one communication channel by a transmitter operating in the same channel. *See also:* radio transmission. (BT) [34]

cocktail shaker sort An exchange sort in which adjacent pairs of items are compared and exchanged, if necessary, and alternate passes through the set proceed in opposite directions. *Contrast:* bubble sort. (C) 610.5-1990

CODASYL *See:* Conference on Data Systems Languages.

CODASYL database A database that adheres to the standards established by the Database Task Group of CODASYL. *Note:* A network database is generally accepted to be synonymous with a CODASYL database. (C) 610.5-1990

CODASYL model A network database model defined by the CODASYL organization. The CODASYL model is based on sets that are used to specify associations between different record types that exist in a database. *Synonym:* flex model. (C) 610.5-1990

CODASYL set *See:* set.

code (1) (microprocessor object modules) Data or executable machine code. *See also:* absolute code; relocatable code.

(C/MM) 695-1985s

(2) (computer terminology) A character or bit pattern that is assigned a particular meaning; for example, a status code. (C) 610.12-1990, 610.5-1990

(3) (A) The characters or expressions of an originating or source language, each correlated with its equivalent expression in an intermediate or target language, for example, alphanumeric characters correlated with their equivalent six-bit expressions in a binary machine language. *Note:* For punched or magnetic tape; a predetermined arrangement of possible locations of holes or magnetized areas and rules for interpreting the various possible patterns. **(B)** Frequently, the set of expressions in the target language that represent the set of characters of the source language. **(C)** To encode is to express given information by means of a code. **(D)** To translate the program for the solution of a problem on a given computer into a sequence of machine-language or pseudo instructions acceptable to that computer. (C) 162-1963w

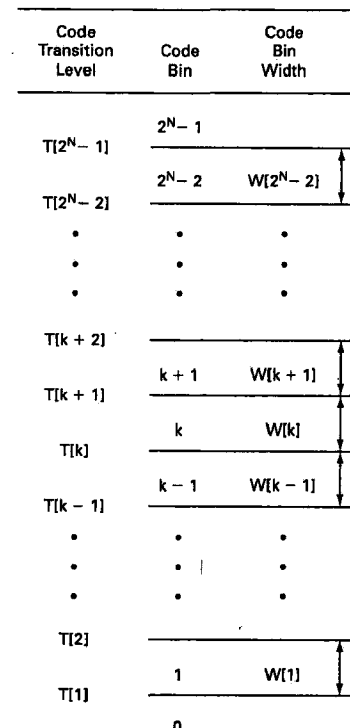
(4) (A) (computer terminology) In software engineering, computer instructions and data definitions expressed in a programming language or in a form output by an assembler, compiler, or other translator. *See also:* machine code; microcode; object code; source code. **(B) (computer terminology)** To express a computer program in a programming language. (C) 610.12-1990

(5) (A) (computer terminology) A set of rules used to convert data from one form of representation to another. *Synonyms:* coding scheme; data code; data element tag. **(B) (computer terminology)** To represent data in symbolic form. **(C) (computer terminology)** Data that have been expressed in symbolic form. (C) 1084-1986w, 610.5-1990

(6) (A) (computer terminology) Data that have been converted from one form of representation to another, using a set of rules as in definition (5A). *Synonym:* encoded data. *See also:* code set; coded representation; symbol. **(B) (computer terminology)** To convert data from one form of representation to another, using a set of rules as in definition (5A). *See also:* decode; encode. (C) 610.5-1990

code audit (software) An independent review of source code by a person, team, or tool to verify compliance with software design documentation and programming standards. Correctness and efficiency may also be evaluated. *See also:* audit; code; correctness; efficiency; inspection; static analysis; tool; walk-through. (C/SE) 729-1983s

code bin *k* A digital output that corresponds to a particular set of input values.



Definitions pertaining to input quantization code bin *K*

(IM) 1057-1994

code bin width *W[k]* The difference of the code transition levels that delimit the bin.

$$W[k] = T[k + 1] - T[k]$$

(IM) 1057-1994

code-bit In 100BASE-X, the unit of data passed across the PMA service interface, and the smallest signaling element used for transmission on the medium. A group of five code-bits constitutes a code-group in the 100BASE-X PCS. (C/LM) 802.3u-1995

code breakpoint A breakpoint that is initiated upon execution of a given computer instruction. *Synonym:* control breakpoint. *Contrast:* data breakpoint. *See also:* dynamic breakpoint; epilog breakpoint; programmable breakpoint; prolog breakpoint; static breakpoint. (C) 610.12-1990

code c A combination of a coder and decoder operating in different directions of transmission in the same equipment. (COM) 1007-1991

code character A particular arrangement of code elements representing a specific symbol or value. (COM/PE) [49], 599-1985w

code classes (safety systems equipment in nuclear power generating stations) Levels of structural integrity and quality commensurate with the relative importance of the individual mechanical components of the nuclear power generating station. *Note:* For the recognized code classes, refer to the following documents: ANSI N18.2-1973, *Nuclear Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants*; ANSI/ANS 51.8, *Nuclear Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants*; ANSI/ASME BPV-III, *Boiler and Pressure Vessel Cod* and its latest addenda, Section III; ANSI/ANS 52.1-1980, *Nuclear Safety Criteria for Design of Stationary BWR Plants*. (PE) 627-1980r

code conversion (telephone switching systems) The substitution of a routing code for a destination code. (COM) 312-1977w

code converter A converter that changes the representation of data from one code to another. (C) 610.10-1994, 610.5-1990