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IEEE Std 100-1996

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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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THE IEEE STANDARD DICTIONARY
OF ELECTRICAL AND~~

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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 In some cases, terms from withdrawn standards are included when no current source can be found.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.

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How to use this dictionary

The terms defined in this dictionary are listed in *letter-by-letter* alphabetical order. Spaces are ignored in this style of alphabetization, so *cable value* will come before *cab signal*. Descriptive categories associated with the term in earlier editions of IEEE Std 100 will follow the term in parentheses. New categories appear after the definitions (see Categories, below), followed by the designation of the standard or standards that include the definition. If a standard designation is followed by the letter *s*, it means that edition of the standard was superseded by a newer revision and the term was not included in the revision. If a designation is followed by the letter *w*, it means that edition of the standard was withdrawn and not replaced by a revision. A bracketed number refers to the non-IEEE standard sources given in the back of the book.

Acronyms and abbreviations are no longer listed in a separate section in the dictionary; rather, they are incorporated alphabetically with other terms. Each acronym or abbreviation refers to its expanded term, where it is defined. Acronyms and abbreviations for which no definition was included in past editions have been deleted from this edition of IEEE Std 100.

Abstracts of the current set of approved IEEE standards are provided in the back of the book. It should be noted that updated information about IEEE standards can be obtained at any time from the IEEE Standards World Wide Web site at <http://standards.ieee.org/>.

Categories

The category abbreviations that are used in this edition of IEEE Std 100 are defined below. This information is provided to help elucidate the context of the definition. Older terms for which no category could be found have had the category "Std100" assigned to them. Note that terms from sources other than IEEE standards, such as the National Electrical Code® (NEC®) or the National Fire Protection Association, may not be from the most recent editions; the reader is cautioned to check the latest editions of all sources for the most up-to-date terminology.

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the secondary reflects the value of the quantity applied to the primary. (PE) [57]

ACD See: automatic call distribution.

ac-dc general-use snap switch A form of general-use snap switch suitable for use on either ac or dc circuits for controlling the following:

- Resistive loads not exceeding the ampere rating of the switch at the voltage applied.
- Inductive loads not exceeding 50% of the ampere rating of the switch at the applied voltage. Switches rated in horsepower are suitable for controlling motor loads within their rating at voltage applied.
- Tungsten-filament lamp loads not exceeding the ampere rating of the switch at the applied voltage if "T" rated.

(NEC/NESC) [86]

ACE See: area control error.

ac electric field strength The electric field strength produced by ac power systems as defined by its space components along three orthogonal axes. For steady-state sinusoidal fields, each component can be represented by a complex number or phasor. The magnitudes of the components are expressed by their rms values in volts per meter, and their phases need not be the same. *Notes:* 1. A phasor is a complex number expressing the magnitude and phase of a time-varying quantity. Unless otherwise specified, it is used only within the context of linear systems driven by steady-state sinusoidal sources. In polar coordinates, it can be written as $Ae^{j\phi}$ where A is the amplitude or magnitude (usually rms but sometimes indicated as peak value) and ϕ is the phase angle. The phase angle should not be confused with the space angle of a vector. 2. The space components (phasors) are not vectors. The space components have a time-dependent angle while vectors have space angles. For example, the sinusoidal electric field strength, \vec{E} , can be expressed in rectangular coordinates as

$$\vec{E} = \vec{a}_x E_x + \vec{a}_y E_y + \vec{a}_z E_z$$

where, for example, the x component is

$$E_x = \text{Re} (E_{x0} e^{j\phi_x} e^{j\omega t}) = E_{x0} \cos (\phi_x + \omega t)$$

The magnitude, phase, and time-dependent angle are given by E_{x0} , ϕ_x , and $(\phi_x + \omega t)$, respectively. In this representation, the space angle of the x component is specified by the unit vector \vec{a}_x . An alternative general representation of a steady-state sinusoidal electric field can be derived algebraically from equation 1 above and is perhaps more useful in characterizing power-line fields because the fields along the direction of the line are small and can usually be neglected. It is a vector rotating in a plane where it describes an ellipse whose major semi-axis represents the magnitude and direction of the maximum value of the electric field, and whose minor semi-axis represents the magnitude and direction of the field a quarter-cycle later. As mentioned above, the electric field in the direction perpendicular to the plane of the ellipse is assumed to be zero. See also: polyphase ac fields; single-phase ac fields. (PE/T&D) 539-1990

ac electric field strength meter (1) A meter designed to measure the power-frequency electric field. Two types of electric field strength meters are in common use.

(PE/T&D) 539-1990

(2) A meter designed to measure ac electric fields. Three types of electric field strength meters are available—free-body meter, ground-reference meter, and electro-optic meter.

(PE/T&D) 1308-1994

acetate disks Mechanical recording disks, either solid or laminated, that are made of various acetate compounds.

(SP) [32]

ACF See: access control field.

ac filter Resistor-capacitor circuits connected in three-phase wye or delta on the ac terminals of a converter.

(IA) 995-1987w

ac general-use snap switch A form of general-use snap switch suitable only for use on alternating-current circuits for controlling the following:

- Resistive and inductive loads, including electric-discharge lamps, not exceeding the ampere rating of the switch at the voltage involved.
- Tungsten-filament lamp loads not exceeding the ampere rating of the switch at 120 V.
- Motor loads not exceeding 80% of the ampere rating of the switch at its rated voltage.

(NEC/NESC) [86]

achromatic locus (achromatic region) (television) A region including those points in a chromaticity diagram that represent, by common acceptance, arbitrarily chosen white points (white references). *Note:* The boundaries of the achromatic locus are indefinite, depending on the tolerances in any specific application. Acceptable reference standards of illumination (commonly referred to as white light) are usually represented by points close to the locus of Planckian radiators having temperatures higher than about 2000 °K. While any point in the achromatic locus may be chosen as the reference point for the determination of dominant wavelength, complementary wavelength, and purity for specification of object colors, it is usually advisable to adopt the point representing the chromaticity of the illuminator. Mixed qualities of illumination and luminators with chromaticities represented very far from the Planckian locus require special consideration. After a suitable reference point is selected, dominant wavelength may be determined by noting the wavelength corresponding to the intersection of the spectrum locus with the straight line drawn from the reference point through the point representing the sample. When the reference point lies between the sample point and the intersection, the intersection indicates the complementary wavelength. Any point within the achromatic locus chosen as a reference point may be called an achromatic point. Such points have also been called white points. (BT) 201-1979w

acid-resistant So constructed that it will not be injured readily by exposure to acid fumes. (IA) [60], [75]

ACK See: acknowledge character.

ack cycle A cycle in which a slave responds to a master and terminates a transaction. (C/MM) 1196-1987

acknowledge An acknowledge packet. (C/MM) 1394-1995

acknowledge bit A bit used by IEEE 802.3 Auto-Negotiation to indicate that a station has successfully received multiple identical copies of the Link Code Word. This bit is only set after an identical Link Code Word has been received three times in succession. (C/LM) 802.3u-1995

acknowledge character (ACK) (A) A transmission control character transmitted by a station as an affirmative response to the station with which the connection has been set up. **(B)** A transmission control character transmitted by a receiver as an affirmative response to a sender. An acknowledge character may also be used as an accuracy control character. See also: negative acknowledge character. (C) 610.5-1990

acknowledge gap The period of idle bus between the end of a packet and the start of an acknowledge. (C/MM) 1394-1995

acknowledge packet (1) A link-layer packet returned by a destination node back to a source node in response to most primary packets. An acknowledge packet is always exactly 8 bits long. (C/MM) 1394-1995

(2) The first packet returned by an individually addressed S-module that conveys to the M-module that the appropriate S-module is responding and indicates the current status of the responding S-module. (C/TT) 1149.5-1995

acknowledger (forestaller) A manually operated electric switch or pneumatic valve by means of which, on a locomotive equipped with an automatic train stop or train control device, an automatic brake application can be forestalled, or

by means of which, on a locomotive equipped with an automatic cab signal device, the sounding of the cab indicator can be silenced. (EEC/PE) [119]

acknowledging (forestalling) The operating by the engineman of the acknowledger associated with the vehicle-carried equipment of an automatic speed control or cab signal system to recognize the change of the aspect of the vehicle-carried signal to a more restrictive indication. The operation stops the sounding of the warning whistle, and in a locomotive equipped with speed control, it also forestalls a brake application. (EEC/PE) [119]

acknowledging device See: acknowledger.

acknowledging switch See: acknowledger.

acknowledging whistle An air-operated whistle that is sounded when the acknowledging switch is operated. Its purpose is to inform the fireman that the engineman has recognized a more restrictive signal indication. (EEC/PE) [119]

acknowledgment See: acknowledgment of a message.

acknowledgment of a message A reply transmitted by a receiving station to inform the sending station that a message has arrived and the message is error-free. *Synonym:* acknowledgment. *Contrast:* negative acknowledgment. (C) 610.7-1995

ACL See: audit command language.

a contact A contact that is open when the main device is in the standard reference position and that is closed when the device is in the opposite position. *Notes:* 1. a contact has general application. However, this meaning for front contact is restricted to relay parlance. 2. For indication of the specific point of travel at which the contact changes position, an additional letter or percentage figure may be added to a. See also: standard reference position. (PE/SWG) C37.100-1992

acoustic absorber Material with high acoustic loss placed on any part of the substrate for acoustic absorption purposes. (UFFC) 1037-1992

acoustical depth finder See: echo sounder.

acoustically tunable optical filter An optical filter that is driven by an acoustic wave and that is tunable by varying the acoustic frequency. (UFFC) [17]

acoustic coupler (1) A type of data communication equipment that has sound transducers that permit the use of a telephone handset as a connection to a voice communication system for the purpose of data transmission. (COM/LM) 168-1956w
(2) A modem that interconnects a communicating device with a telephone handset. (C) 610.7-1995

acoustic delay line (1) A delay line whose operation is based on the time of propagation of sound waves. (C) [20], [85]
(2) A delay line whose operation is based on the time of propagation of sound waves within a given medium. *Synonym:* sonic delay line. See also: mercury storage. (C) 610.10-1994

acoustic echo path (1) In a telephone set, the coupling from the receiver to the microphone (or transmitter) (COM) 269-1992

(2) In a handset or headset system, the coupling from the receiver to the microphone (or transmitter). (COM) 1206-1994

acoustic-gravity wave (radio-wave propagation) In the atmosphere, a low-frequency wave whose restoring forces are compressional, gravitational and buoyant. (AP) 211-1990

acoustic input The free-field sound pressure level developed by an artificial mouth at the mouth reference point. See also: sound pressure level. (COM) 1206-1994, 269-1992

acoustic interferometer An instrument for the measurement of wavelength and attenuation of sound. Its operation depends upon the interference between reflected and direct sound at the transducer in a standing-wave column. See also: instrument. (EEC/PE) [119]

acoustic memory See: acoustic storage.

acoustic noise See: audible noise.

acoustic output The sound pressure level developed in an artificial ear. See also: sound pressure level. (COM) 1206-1994, 269-1992

acoustic propagation loss Amplitude decay of the acoustic wave due to material damping; scattering caused by defects, surface finish, or electrodes; and acoustic bulk-wave radiation into the ambient environment. Specifically, this is the ratio of the power transmitted in a surface acoustic wave (SAW) beam to the power received, expressed in dB. (UFFC) 1037-1992

acoustic radiator A means for radiating acoustic waves. (EEC/PE) [119]

acoustic regeneration The generation of a secondary acoustic wave by the potential variations of an electrode caused by a primary surface acoustic wave passing under it. (UFFC) 1037-1992

acoustic storage A type of storage consisting of acoustic delay lines. (C) 610.10-1994

acoustic tablet A data tablet on which the position of the sensor or stylus is determined by acoustic sensing techniques. (C) 610.10-1994

acoustic wave filter A filter designed to separate acoustic waves of different frequencies. *Note:* Through electroacoustic transducers, such a filter may be associated with electric circuits. See also: filter. (EEC/PE) [119]

acoustic waveguide A perturbation along the direction of propagation of a surface acoustic wave to produce a decreased phase velocity, and hence, transverse concentration and guiding of the surface acoustic wave. (UFFC) 1037-1992

acousto-optic device A device that is used to modulate light in amplitude, frequency, phase, polarization, or spatial position by virtue of optical diffraction from an acoustically generated diffraction grating. (UFFC) [23]

acousto-optic effect (fiber optics) A periodic variation of refractive index caused by an acoustic wave. *Note:* The acousto-optic effect is used in devices that modulate and deflect light. See also: modulation. (Std100) 812-1984w

ac power-line fields Power frequency electric and magnetic fields produced by ac power lines. (PE/T&D) 539-1990

acquirer (1) An organization that procures software products for itself or another organization. (C/SE) J-STD-016-1995

(2) A person or organization that acquires or procures a system or software product (which may be part of a system) from a supplier. (C/SE) 1062-1993

acquisition (1) The process of obtaining a system or software product. (C/SE) 1062-1993

(2) The process of establishing a stable track on a target that is designated in one or more coordinates. A search of a limited given volume of coordinate space is usually required because of errors or incompleteness of the designation. (AE) 686-1990w

acquisition phase The final phase of the arbitration operation entered after determining that an agent has the highest priority and the bus is available. See also: agent; arbitration operation. (C/MM) 1296-1987s

acquisition probability The probability of establishing a stable track on a designated target. (AE) 686-1990w

acquisition start time The start time of the acquisition of the histogram data, as DD/MM/YR_HH:NN:SS_

where the '_' (underscore character) is an ASCII space; DD is the day; MM is the month; YR is the year; HH is the hours; NN is the minutes; and SS is the seconds. (NPS) 1214-1992

across-the-line starter (electric installations on shipboard) A device that connects the motor to the supply without the use of a resistance or autotransformer to reduce the voltage. It may consist of a manually operated switch or a master switch, which energizes an electromagnetically operated contactor. (IA) 45-1983r

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