

EXHIBIT E

R 621.3 IEEE
IEEE Std 100-1996



0007406340

FOR
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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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ISBN 1-55937-833-6



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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 If a standard designation is followed by the letter s, it means that edition of the standard was superseded by a newer revision and the term was not included in the revision. If a designation is followed by the letter w, it means that edition of the standard was withdrawn and not replaced by a revision.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

inline code

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input-output channel

inline code A sequence of computer instructions that is physically contiguous with the instructions that logically precede and follow it. (C) 610.12-1990

inline recovery Recovery performed by resuming a process at a point preceding the occurrence of a failure. *Contrast:* backward recovery; forward recovery. (C) 610.5-1990

inner jacket A jacket that is extruded over the cable core covering to provide additional dielectric strength when it is needed between the conductors and the shield. An inner jacket may be used in cables that are used for direct burial and also where high ground potential rise is to be withstood. *See also:* cable jacket. (PE) 789-1988r

inner storage *See:* internal storage.

inoperable time The part of down-time in which all environmental conditions are satisfied, during which a device would not yield correct results if it were operated. (C) 610.10-1994

inorder traversal The process of traversing a binary tree in a recursive fashion as follows: the left subtree is traversed in order, then the root is visited, then the right subtree is traversed in order. *Synonym:* symmetric traversal. *Contrast:* postorder traversal; preorder traversal. *See also:* converse inorder traversal. (C) 610.5-1990

in-phase spring rate (dynamically tuned gyro) (inertial sensors) The residual difference, in a dynamically tuned gyro, between the dynamically induced spring rate and the flexure spring rate. (AE/PE) 528-1994, 762-1987r

in-phase video (I) One of a pair of coherent, bipolar video signals derived from the RF or IF signal by a pair of synchronous detectors with a 90° phase difference between the coherent oscillator (cobo) reference inputs used for each. The other coherent video signal of the pair is designated as quadrature video. *See also:* quadrature video. (AE) 686-1990w

in-plant system A communications system whose parts, including remote terminals, may be all situated in one building or several buildings. *Synonym:* in-house system. (C) 610.7-1995

input (I) (A) (data transmission) The data to be processed. (B) (data transmission) The state or sequence of states occurring on a specified input channel. (C) (data transmission) The device or collective set of devices used for bringing data into another device. (D) (data transmission) A channel for impressing a state on a device or logic element. (E) (data transmission) The process of transferring data from an external storage to an internal storage. (PE) 599-1985w

(2) (A) (software) Pertaining to data received from an external source. *Contrast:* output. (B) (software) Pertaining to a device, process, or channel involved in receiving data from an external source. *Contrast:* output. (C) (software) To receive data from an external source. *Contrast:* output. (D) (software) To provide data from an external source. *Contrast:* output. (E) (software) Loosely, input data. *Contrast:* output. (C) 610.12-1990

(3) Pertaining to a device, process, or channel involved in the reception of data. (C) 610.10-1994

(4) (to a relay) A physical quantity or quantities to which the relay is designed to respond. *Notes:* 1. A physical quantity that is not directly related to the prescribed response of a relay (though necessary, to or in some way affecting the relay operation), is not considered part of input. 2. Time is not considered a relay input, but it is a factor in performance. (PE/SWG) C37.100-1992

input angle (gyros) The angular displacement of the case about an input axis. (AE) 528-1994

input area An area of storage reserved for input data. (C) 610.10-1994

tion. *See also:* inductive assertion method.

(C) 610.12-1990

input axis (IA) (I) (accelerometer) The axis along or about which an input causes a maximum output.

(AE) 528-1994

(2) (gyros) The axis about which a rotation of the case causes a maximum output. For a conventional gyro, the input axis is normal to the spin axis. For an optical gyro, the input axis is perpendicular to a plane established by the light beams.

(AE) 528-1994

input-axis misalignment (accelerometer) (gyros) The angle between an input axis and its associated input reference axis when the device is at a null condition. (The magnitude of this angle is unambiguous, but when components are reported, the convention should always be identified. IEEE standards use both direction cosines and right-handed Euler angles, depending on the principal field of application. Other conventions, differing both in signs and designation of axes, are sometimes used.) (AE) 528-1994

input buffer *See:* buffer.

input buffer register A data buffer register that accepts data from an input unit such as a magnetic tape drive or magnetic disk and which then transfers this data to internal storage.

(C) 610.10-1994

input channel A channel employed only for data input; for example, to impress a state on a device or logic element; or to transfer data from an external storage unit to an internal storage unit. *See also:* input-output channel; output channel.

(C) 610.10-1994

input data (test pattern language) The binary data that is written into a memory array. It is identified by the symbol "D." (C/TT) 660-1986w

input device A device used to enter data into a computer system. *Note:* Commonly used input devices include light pens and keyboards. *Synonym:* input unit. *Contrast:* output device. *See also:* cursor control device; graphic input device; graphical input device; input-output device; logical input device; pick device; string device.

(C) 1084-1986w, 610.10-1994, 610.6-1991

input impedance (I) (analog computer) In an analog computer, a passive network connected between the input terminal or terminals of an operational amplifier and its summing junction.

(C) 165-1977w

(2) (at a transmission line port) (waveguide) The impedance at the transverse plane of the port. *Note:* This impedance is independent of the generator impedance.

(MTT) 146-1980w

(3) The impedance between the signal input of the waveform recorder and ground. (IM) 1057-1994

(4) (of an antenna) The impedance presented by an antenna at its terminals. (AP) 145-1993

input limiter A limiter circuit employing biased diodes in the amplifier input channel, that operates by limiting current entering the summing junction. (C) 610.10-1994

input limits (accelerometer) (gyros) The extreme values of the input, generally plus or minus, within which performance is of the specified accuracy. (AE) 528-1994

input media Media that are employed as input; for example, punched cards; magnetic disks. *Contrast:* output media.

(C) 610.10-1994

input-output Pertaining to input, output, or both.

(C) 610.10-1994

input-output area *See:* buffer.

input-output bound (io bound) Pertaining to any process that performs input-output operations which take a long time relative to the time of CPU operations performed. *Contrast:* compute-bound. (C) 610.10-1994

input-output channel A channel that handles the transfer of

quadlet (1) A set of four adjacent bytes.
(BA/C) 1014.1-1994, 10857-1994, 896.3-1993, 896.4-1993

(2) A unit of computer data consisting of 32 bits.
(BA/C) 1275-1994

(3) Four bytes (32 bits) of data.
(C/MM) 1212-1991s, 1394-1995, 1596-1992, 1754-1994

(4) A 4-byte data format or data type.
(C/MM) 1596.5-1993

(5) Four bytes of data.
(C/MM) 1596.4-1996

quadlet aligned address An address with zeros in the least significant two bits.
(C/MM) 1394-1995

quadrant This pertains to the investigation and study of tamper protection concepts and mechanisms. *See also:* tamper protection.
(BA/C) 896.3-1993

quadrantal error (navigation) (navigation aid terms) An angular error in measured bearing caused by characteristics of the vehicle or station which adversely affect the direction of signal propagation; the error varies in a sinusoidal manner throughout the 360° and has two positive and two negative maximums.
(AE) 172-1983w

quadratic lag *See:* lag.

quadratic profile *See:* parabolic profile.

quadrature The relation between two periodic functions when the phase difference between them is one-fourth of a period. *See also:* network analysis.
(Std100) 270-1966w

quadrature-acceleration drift rate (dynamically tuned gyro) A drift rate about an axis, normal to both the spin axis and the axis along which an acceleration is applied. This drift rate results from a torque about the axis of applied acceleration and is in quadrature with that due to mass unbalance.
(AE) 528-1994

quadrature amplitude modulation A modulation technique that uses variations in signal amplitude and phase to represent data-encoded symbols as a number of states.
(C) 610.7-1995

quadrature axis (synchronous machines) The axis that represents the direction of the radial plane along which the main field winding produces no magnetization, normally coinciding with the radial plane midway between adjacent poles. *Notes:* 1. The positive direction of the quadrature axis is 90 degrees ahead of the positive direction of the direct axis, in the direction of rotation of the field relative to the armature. 2. The definitions of currents and voltages given in the terms listed below are applicable to balanced load conditions and for sinusoidal currents and voltages. They may also be applied under other conditions to the positive-sequence fundamental-frequency components of currents and voltages. More generalized definitions, applicable under all conditions, have not been agreed upon.
(PE) [9]

quadrature-axis component (I) (armature voltage) That component of the armature voltage of any phase that is in time phase with the quadrature-axis component of current in the same phase. *Note:* A quadrature-axis component of voltage may be reproduced by:

- a) rotation of the direct-axis component magnetic flux;
- b) variation (if any) of the quadrature-axis component of magnetic flux;
- c) resistance drop caused by flow of the quadrature-axis component of armature current. The quadrature-axis component of terminal voltage is related to the synchronous internal voltage by

$$E_{qs} = E_f - RI_{qs} - jX_d I_{sd}$$

See also: phasor diagram.
(EEC/PE) [119]

(2) (armature current) That component of the armature current that produces a magnetomotive-force distribution that

axis in quadrature with the axis of the poles. *See also:* asynchronous machine; direct-axis synchronous impedance.
(PE) [9]

quadrature-axis current (rotating machinery) The current that produces quadrature-axis magnetomotive force. *See also:* direct-axis synchronous impedance.
(PE) [9]

quadrature-axis magnetic flux (rotating machinery) The magnetic-flux component directed along the quadrature axis. *See also:* direct-axis synchronous impedance.
(PE) [9]

quadrature-axis operational inductance (standstill frequency response testing) (synchronous machine parameters by standstill frequency testing) The ratio of the Laplace transform of the quadrature-axis armature flux linkages to the Laplace transform of the quadrature-axis current.
(PE) 115A-1987

quadrature-axis subtransient impedance (rotating machinery) The operator expressing the relation between the initial change in armature voltage and a sudden change in quadrature-axis armature current, with only the fundamental-frequency components considered for both voltage and current, with no change in the voltage applied to the field winding, and with the rotor running at steady speed. In terms of network theory it corresponds to the quadrature-axis impedance the machine displays against disturbances (modulations) with infinite frequency. *Note:* If no rotor winding is along the quadrature axis and/or the rotor is not made out of solid steel, this impedance equals the quadrature-axis synchronous impedance. *See also:* asynchronous machine; direct-axis synchronous impedance.
(PE) [9]

quadrature-axis subtransient open-circuit time constant The time in seconds required for the rapidly decreasing component (negative) present during the first few cycles in the direct-axis component of symmetrical short-circuit conditions with the machine running at rated speed, to decrease to $1/e \Delta 0.368$ of its initial value.
(EEC/PE) [119]

quadrature-axis subtransient reactance The ratio of the fundamental component of reactive armature voltage due to the initial value of the fundamental quadrature-axis component of alternating-current component of the armature current, to this component of current under suddenly applied balanced load conditions and at rated frequency. Unless otherwise specified, the quadrature-axis subtransient reactance will be that corresponding to rated armature current.
(EEC/PE) [119]

quadrature-axis subtransient short-circuit time constant The time in seconds required for the rapidly decreasing component present during the first few cycles in the quadrature-axis component of the alternating-current component of the armature current under suddenly applied symmetrical short-circuit conditions, with the machine running at rated speed to decrease to $1/e \Delta 0.368$ of its initial value.
(EEC/PE) [119]

quadrature-axis subtransient voltage (rotating machinery) The quadrature-axis component of the terminal voltage that appears immediately after the sudden opening of the external circuit when the machine is running at a specified load, before any flux variation in the excitation and damping circuits has taken place.
(PE) [9]

quadrature-axis synchronous impedance (rotating machinery) (synchronous machines) The impedance of the armature winding under steady-state conditions where the axis of the armature current and magnetomotive force coincides with the quadrature axis. In large machines where the armature resistance is negligibly small, the quadrature-axis synchronous impedance is equal to the quadrature-axis synchronous reactance.
(PE) [9]

quadrature-axis synchronous reactance The ratio of the fundamental component of reactive armature voltage, due to the fundamental quadrature-axis component of armature current,

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