

IEEE Std 100-1996

The IEEE Standard Dictionary of Electrical and Electronics Terms

Sixth Edition



Published by the
Institute of Electrical and
Electronics Engineers, Inc.

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OCT 11 2000

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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.

ISBN 1-55937-833-6



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 In some cases, terms from withdrawn standards are included when no current source can be found.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

demand register—single-pointer form An indicating demand register from which the demand is obtained by reading the position of a pointer relative to the markings on a scale. The single pointer is resettable to zero.

(ELM) C12.1-1988

demand-totalizing relay A device designed to receive and totalize electric pulses from two or more sources for transmission to a demand meter or to another relay. *See also:* demand meter.

(ELM) C12.1-1982s

demarcation strip (data transmission) The terminals at which the telephone company's service ends and the customer's equipment is connected.

(PE) 599-1985w

demineralization The process of removing dissolved minerals (usually by chemical means).

(Std100) [71]

demodulate To receive signals transmitted over a communications computer, and to convert them into electrical pulses that can serve as inputs to a computer system. *Contrast:* modulate.

(C) 610.7-1995

demodulation (1) A modulation process wherein a wave resulting from previous modulation is employed to derive a wave having substantially the characteristics of the original modulating wave. *Note:* The term is sometimes used to describe the action of a frequency converter or mixer, but this practice is deprecated except in the case of shifting a single-sideband signal to baseband.

(IT) [123]

(2) (data transmission) A modulation process wherein a wave resulting from previous modulation is employed to derive a wave substantial to the characteristics of the original modulating wave. *Note:* The term is sometimes used to describe the action of a frequency converter or mixer, but this practice is deprecated.

(PE) 599-1985w

(3) (overhead power lines) The process by which the signal is recovered from a modulated carrier.

(PE/T&D) 539-1990

(4) The reconversion of a modulated signal back into its original form by extracting the data from the modulated carrier. *Contrast:* modulation.

(C) 610.7-1995

demodularization In software design, the process of combining related software modules, usually to optimize system performance. *See also:* downward compression; lateral compression; upward compression.

(C) 610.12-1990

demodulator A device to effect the process of demodulation. *See also:* demodulation.

(Std100) 270-1964w

demodulator-modulator *See:* modem.

demonstration (1) (safety systems equipment in nuclear power generating stations) The provision of evidence to support the conclusion derived from assumed premises.

(PE) 627-1980r

(2) (Class 1E battery chargers and inverters) A course of reasoning showing that a certain result is a consequence of assumed premises; an explanation or illustration, as in teaching by use of examples.

(PE) 650-1979s

(3) (software) A dynamic analysis technique that relies on observation of system or component behavior during execution, without need for post-execution analysis, to detect errors, violations of development standards, and other problems. *See also:* testing.

(C) 610.12-1990

demultiplexer An electronic switch with one input and several outputs. Encoded selection signals control which output is connected to the input. *Contrast:* multiplexer.

(C) 610.7-1995

demultiplexing The separation from a common input into several outputs. For example, hardware may demultiplex signals from a transmission line based on time or carrier frequency to allow multiple, simultaneous transmissions across a single physical cable. *Contrast:* multiplexing.

(C) 610.7-1995

denary *See:* decimal.

denial of message service Preventing or delaying the performance of legitimate or critical communication services. Denial of message service attacks may be perpetrated at any point in the communication architecture (e.g., data link, network,

transport, application), and could result in denial of service conditions.

(BA/C) 896.3-1993

denormalized number (1) (mathematics of computing) A nonzero floating-point number whose exponent has a reserved value, usually the format's minimum, and whose explicit or implicit significand digit is zero.

(C) 1084-1986w

(2) (binary floating-point arithmetic) A nonzero floating-point number whose exponent has a reserved value, usually the format's minimum, and whose explicit or implicit leading significand bit is zero.

(C/MM) 754-1985r

dense binary code A binary code in which all possible bit combinations are used.

(C) 1084-1986w

dense list *See:* packed array.

densitometer (illuminating engineering) A photometer for measuring the optical density (common logarithm of the reciprocal of the transmittance or reflectance) of materials.

(EEC/IE) [126]

density (1) (facsimile) A measure of the light-transmitting or reflecting properties of an area. *Notes:* 1. It is expressed by the common logarithm of the ratio of incident to transmitted or reflected light flux. 2. There are many types of density that will usually have different numerical values for a given material; for example, diffuse density, double diffuse density, specular density. The relevant type of density depends upon the geometry of the optical system in which the material is used. *See also:* scanning.

(COM) 168-1956w

(2) (electron or ion beam) The density of the electron or ion current of the beam at any given point.

(Std100) [84]

(3) (computers) *See also:* packing density.

(4) (A) On an integrated circuit, the number of logic gates per unit area of usable surface. *See also:* chip density; surface density. **(B)** A measure of the number of characters per inch on an output medium such as paper. *See also:* recording density.

(C) 610.10-1994

density coefficient *See:* environmental coefficient.

density-modulated tube (microwave tubes) (space-charge-control tube) Microwave tubes or valves characterized by the density modulation of the electron stream by a gating electrode. *Note:* The electron stream is collected on those electrodes that form a part of the microwave circuit, principally the anode. These electrodes are often small compared to operating wavelength so that for this reason space-charge-control tubes or valves are often not considered to be microwave tubes even though they are used at microwave frequencies.

(ED) [45]

density modulation (electron beams) The process whereby a desired time variation in density is impressed on the electrons of a beam. *See also:* velocity-modulated tube.

(Std100) [84]

density-tapered array antenna *See:* space-tapered array antenna.

denuder That portion of a mercury cell in which the metal is separated from the mercury.

(EEC/PE) [119]

dependability (of a relay or relay system) The facet of reliability that relates to the degree of certainty that a relay or relay system will operate correctly.

(PE/SWG) C37.100-1992, C37.90-1978s

dependable capability (power operations) The maximum generation, expressed in kilowatt-hours per hour (kWh/h) which a generating unit, station, power source, or system can be depended upon to supply on the basis of average operating conditions.

(PE) 858-1987s

dependable capacity The maximum capacity modified for ambient limitations that a generating unit, power plant, item of electrical equipment, or system can sustain over a specified period of time.

(PE) 762-1987r, 858-1993

dependency (1) A logical relationship between two tests or between a test and an element of the unit under test (UUT) (either an actual part or a failure mode of a part). A diagnostic test is said to be dependent on a particular diagnostic element

multiple spot scanning (facsimile) The method in which scanning is carried on simultaneously by two or more scanning spots, each one analyzing its fraction of the total scanned area of the subject copy. *See also:* scanning.

(COM) 168-1956w

multiple street-lighting system A street-lighting system in which street lights, connected in multiple, are supplied from a low-voltage distribution system. *See also:* alternating-current distribution; direct-current distribution.

(PE/T&D) [10]

multiple-supply-type ballast A ballast designed specifically to receive its power from an approximately constant-voltage supply circuit and that may be operated in multiple (parallel) with other loads supplied from the same source. *Note:* The deviation in source voltage ordinarily does not exceed plus or minus 5%, but in the case of ballasts designed for a stated input voltage range, the deviation may be greater as long as it is within the stated range.

(EEC) [97]

multiple switchboard (telephone switching systems) A telecommunications switchboard having each line connected to two or more jacks so that the line is within the reach of several operators.

(COM) 312-1977w

multiple system (electrochemistry) The arrangement in a multielectrode electrolytic cell whereby in each cell all of the anodes are connected to the positive bus bar and all of the cathodes to the negative bus bar. *See also:* electrorefining.

(EEC/PE) [119]

multiple threaded list *See:* multilist.

multiple transit signals Spurious signals having delay time related to the main signal delay by small odd integers. Specific multiple transit signals may be labeled the third transit (triple transit), fifth transit, etc. There is often a tradeoff available between multiple transit signal levels and bandwidth, delay time, insertion loss, and VSWR (dispersive and nondispersive delay lines).

(UFFC) [22], 1037-1992

multiple transmission line A planar transmission-line configuration employing more than one parallel guiding structure, each of which could form a single planar transmission line.

(MTT) 1004-1987w

multiple tube A space-charge-controlled tube or valve containing within one envelope two or more units or groups of electrodes associated with independent electron streams, through sometimes with one or more common electrodes. Examples: Double diode, double triode, triode-heptode, etc. *Synonym:* multiple valve. *See also:* multiple-unit tube.

(ED) 161-1971w

multiple tube counts (radiation counter tubes) Spurious counts induced by previous tube counts.

(ED/NPS) 161-1971w, 309-1970r

multiple-tuned antenna An antenna designed to operate, without modification, in any of a number of pre-set frequency bands.

(AP) 145-1993

multiple twin quad (telephony) A quad in which the four conductors are arranged in two twisted pairs, and the two pairs twisted together. *See also:* cable.

(EEC/PE) [119]

multiple-unit control (electric traction) A control system in which each motive-power unit is provided with its own controlling apparatus and arranged so that all such units operating together may be controlled from any one of a number of points on the units by means of a master controller.

(EEC/PE) [119]

multiple-unit electric car An electric car arranged either for independent operation or for simultaneous operation with other similar cars (when connected to form a train of such cars) from a single control station. *Note:* A prefix diesel-electric, gas-electric, etc., may replace the word electric. *See also:* electric motor car.

(EEC/PE) [119]

multiple-unit electric locomotive A locomotive composed of two or more multiple-unit electric motive-power units connected for simultaneous operation of all such units from a single control station. *Note:* A prefix diesel-electric, turbine-

electric, etc., may replace the word electric. *See also:* electric locomotive.

(EEC/PE) [119]

multiple-unit electric motive-power unit An electric motive-power unit arranged either for independent operation or for simultaneous operation with other similar units (when connected to form a single locomotive) from a single control station. *Note:* A prefix diesel-electric, gas-electric, turbine-electric, etc., may replace the word electric. *See also:* electric locomotive.

(EEC/PE) [119]

multiple-unit electric train A train composed of multiple-unit electric cars. *See also:* electric motor car.

(EEC/PE) [119]

multiple-unit tube *See:* multiple tube.

multiple valve *See:* multiple tube.

multiple-valve unit (MVU) A single structure comprising more than one valve.

(PE/SUB) 857-1996

multiplex To interleave or simultaneously transmit two or more messages on a signal channel.

(C/PE) 599-1985w, 610.10-1994

multiplex equipment, asynchronous A transmission interconnection device that interleaves nonsynchronous low bit-rate digital signals to form a single high bit-rate digital signal. It also performs the reverse function of dividing a high bit-rate digital signal into multiple nonsynchronous low bit-rate signals. The two processes are referred to in this document as multiplexing (combining signals) and demultiplexing (separating signals). Similarly, the mechanisms used to perform these functions are referred to as multiplex equipment.

(COM) 1007-1991

multiplex equipment, digital The equipment for combining digital signals from one digital level to a higher digital level.

(COM) 1007-1991

multiplex equipment, primary The equipment for combining analog (vf) signals, or digital data signals, to a primary rate digital signal and vice versa.

(COM) 1007-1991

multiplexer (1) (A) (supervisory control, data acquisition, and automatic control) A device that allows the interleaving of two or more signals to a single line or terminal. **(B) (supervisory control, data acquisition, and automatic control)** A device for selecting one of a number of inputs and switching its information to the output.

(PE/SWG/SUB) C37.1-1987s, C37.100-1992

(2) (A) A device that allows the transmission of a number of different signals simultaneously over a single channel or transmission facility. *Synonym:* multiplexor. **(B)** A device capable of interleaving the events of two or more activities or of distributing the events of an interleaved sequence to their respective activities. *Contrast:* demultiplexer.

(C) 610.7-1995

multiplexing (1) (data transmission) (modulation systems) The combining of two or more signals into a single wave (the multiplex wave) from which the signals can be individually recovered.

(PE) 599-1985w

(2) The division of a transmission facility into two or more channels, either by splitting the frequency band transmitted by the channel into narrower bands, each of which is used to constitute a distinct channel (frequency division multiplexing) or by allotting this common channel to several different information channels one at a time (time-division multiplexing).

(PE/SUB) 999-1992

(3) Subdivision of a common channel to make two or more channels by splitting the frequency band transmitted by the common channel into narrower bands, by allotting this common channel to several different information channels, or by other means, one at a time. *Contrast:* demultiplexing. *See also:* frequency-division multiplexing; synchronous time division multiplexing; time compression multiplexing; time multiplexed switching; time-division multiplexing.

(C) 610.7-1995

multiplex lap winding (rotating machinery) A lap winding in which the number of parallel circuits is equal to a multiple of the number of poles.

(PE) [9]