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 In some cases, terms from withdrawn standards are included when no current source can be found.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

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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 "Std 100" 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.

ceeds to completion without additional input or user interaction. *Contrast:* conversational; interactive; real time. (C) 610.12-1990

batch administrator A person who is authorized to use all restricted batch services. (C/PA) 1003.2d-1994

batch client A computational entity that utilizes batch services by making requests of batch servers. Batch clients often provide the means by which users access batch services, although a batch server may act as a batch client by virtue of making requests of another batch server. *Synonym:* client. (C/PA) 1003.2d-1994

Batcher's parallel sort (data management) A merge sort in which corresponding items in two ordered subsets are simultaneously compared and, if necessary, exchanged; the resulting subsets are divided in half and interleaved with one another, and these steps are repeated until the merge is complete. *Note:* This algorithm is particularly appropriate for parallel processing. *Synonyms:* merge exchange sort; odd-even sort. *See also:* bitonic sort. (C) 610.5-1990

batch job A set of computational tasks for a computing system. Batch jobs are managed by batch servers. Once created, a batch job may be executing or pending execution. A batch job that is executing has an associated session leader (a process) that initiates and monitors the computational tasks of the job. *Synonym:* job. (C/PA) 1003.2d-1994

batch job attribute A named data type whose value affects the processing of a batch job. The values of the attributes of a batch job affect the processing of that job by the batch server that manages the job. The attributes defined for a batch job are called the batch job attributes. (C/PA) 1003.2d-1994

batch operator A person who is authorized to use some, but not all, restricted batch services. *Synonym:* operator. (C/PA) 1003.2d-1994

batch node A host containing part or all of a batch system. A *batch node* is a host meeting at least one of the following conditions:

— Is capable of executing a batch client
— Contains a routing queue
— Contains an execution queue

Synonym: node. (C/PA) 1003.2d-1994

batch queue A manageable object that represents a set of batch jobs and is managed by a single batch server. *Note:* Each batch job managed by a batch server is a member of a single batch queue managed by that server. Such a set of batch jobs is called a queue largely for historical reasons. Jobs are selected from the queue for execution based on attributes such as priority, resource requirements, and hold conditions. *Synonym:* queue. (C/PA) 1003.2d-1994

batch queue attribute A named data type whose value affects the processing of all jobs that are members of the queue. A batch queue has attributes that affect the processing of jobs that are members of the queue. The attributes defined for a batch queue are called the batch queue attributes. (C/PA) 1003.2d-1994

batch server A computational entity that provides batch services. *Synonym:* server. (C/PA) 1003.2d-1994

batch service Computational and organizational services performed by a batch system on behalf of batch jobs. Batch services are of two types: *requested* and *deferred.* (C/PA) 1003.2d-1994

batch server name A string that identifies a specific server in a network. A string of characters in the portable character set used to specify a particular server in a network. (C/PA) 1003.2d-1994

batch system A collection of one or more batch servers. *Synonym:* system. (C/PA) 1003.2d-1994

batch user A person who is authorized to make use of batch services. (C/PA) 1003.2d-1994

bathtub curve (software) A graph of the number of failures in a system or component as a function of time. The name is derived from the shape of the graph: a period of decreasing failures (the early-failure period), followed by a relatively steady period (the constant-failure period), followed by a period of increasing failures (the wearout-failure period). (C) 610.12-1990

bath voltage The total voltage between the anode and cathode of an electrolytic cell during electrolysis. It is equal to the sum of

a) equilibrium reaction potential,
b) IR drop,
c) anode polarization, and
d) cathode polarization.

See also: electrolytic cell; tank voltage. (EEC/PE) [119]

bathythermograph (navigation aid terms) A recording thermometer for determining the temperature of the sea at various depths. (AE) 172-1983w

battery (primary or secondary) Two or more cells electrically connected for producing electric energy. [Common usage permits this designation to be applied also to a single cell used independently. In this document, IEEE Std 100, unless otherwise specified, the term "battery" will be used in this dual sense.] (EEC/IA/PE) [119], 446-1995

battery-and-ground pulsing (telephone switching systems) Dial pulsing using battery-and-ground signaling. (COM) 312-1977w

battery-and-ground signaling (telephone switching systems) A method of loop signaling, used to increase the range, in which battery and ground at both ends of the loop are poled oppositely. (COM) 312-1977w

battery cabinet A structure used to support and enclose a group of cells. (SB) 1188-1996

battery carry-over (magnetic tape pulse recorders for electricity meters) A device that maintains actual time of the interval recording from a standby power source for a specified period when the principal power source is inoperative. (ELM) C12.14-1982r

battery charger As defined in IEEE Std 602-1996, static equipment that is capable of restoring and maintaining the charge in a storage battery. (IA) 602-1996

battery chute A small cylindrical receptacle for housing track batteries and so set in the ground that the batteries will be below the frost line. (EEC/PE) [119]

battery-current regulation (generator) That type of automatic regulation in which the generator regulator controls only the current used for battery charging purposes. *See also:* axle-generator system. (EEC/PE) [119]

battery duty cycle (large lead storage batteries) The load currents a battery is expected to supply for specified time periods. (PE) 1115-1992, 485-1983

battery, electric A device that transforms chemical energy into electric energy. *See also:* battery. (PE) 599-1985w

battery eliminator A device that provides direct-current energy from an alternating-current source in place of a battery. *See also:* battery. (PE) 599-1985w

battery feed (telephone loop performance) The direct current (dc) supply and coupling circuit powering the loop. (COM) 820-1984r

battery, power station (1) A battery that is a separate source of energy for communication equipment in power stations. (COM)

(2) (control) A battery that is a separate source of energy for the control of power apparatus in a power station. *See also:* battery. (PE) 599-1985w

battery rack (1) (lead storage batteries) A structure used to support a group of cells. (IA/PE/SB) 1188-1996, 446-1995, 450-1987s

(2) (lead storage batteries) (nuclear power generating station) A rigid structure used to accommodate a group of cells. (PE) 450-1987s

baud (1) (supervisory control, data acquisition, and automatic control) The signaling speed, that is, keying rate of the

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Bits per second is a measure of the rate at which bits are transmitted. (PE/SWG/SUB) C37.1-1994, C37.100-1992 **(2) (data transmission)** The speed at which bits are transmitted; usually expressed in bits per second. (PE) 599-1985w

(3) The number of bits transmitted per unit of time, usually expressed in bits per second (bps). (COM) 1007-1991

(4) The rate of data throughput on the medium in bits per second or hertz, whichever is more appropriate to the context. *Synonym:* bit transfer rate. *Contrast:* baud rate. (C) 610.7-1995

(5) The rate at which data are transmitted, expressed in bits per unit time. *Synonym:* bit transfer rate. *See also:* baud rate. (C) 610.10-1994

(6) The total number of bits per second transferred to or from the Medium Access Control (MAC). For example, 100BASE-T has a bit rate of one hundred million bits per second (10^8 b/s). (C/LM) 802.3u-1995

bit-retention time The retention time for one address location. (ED) 641-1987w

bit serial Pertaining to a method of sequentially processing a contiguous set of bits one at a time over a single wire, according to a fixed sequence. (C) 610.10-1994

bit slice Pertaining to a device consisting of an n-bit functional component, such as an arithmetic and logic unit (ALU), or a sequencer, which may be cascaded with one or more identical devices to expand the width of its function by multiples of n. *See also:* bit slice device; bit slice processor. (C) 610.10-1994

bit slice architecture An architecture in which a section of the register and the arithmetic and logic unit in a computer is placed into one package. *See also:* bit slice processor. (C) 610.10-1994

bit slice device A device that uses bit slice technology. (C) 610.10-1994

bit slice microprocessor *See:* bit slice device; bit slice processor.

bit slice processor A processor that is built from multiple bit slices to any given word-size. (C) 610.10-1994

bits per second (b/s, bps) A unit of data transmission speed, expressed as the number of bits transmitted per second. *Note:* IEEE Std 260.1-1993 specifies b/s as the SI unit symbol for bits per second. *Contrast:* baud rate. (C) 610.7-1995

bits per unit time (test, measurement, and diagnostic equipment) Operating number of bits, handled by a device in a given unit of time, under specified conditions. (MIL) [2]

bit steering A microprogramming technique in which the meaning of a field in a microinstruction is dependent on the value of another field in the microinstruction. *Synonym:* immediate control. *Contrast:* residual control. *See also:* two-level encoding. (C) 610.12-1990

bit stream A continuous stream of bits transmitted over a channel with no separators between the character groups. (C) 610.10-1994, 610.7-1995

bit string (1) A sequence of binary digits; for example, the bit string 0101001. *See also:* character string. (C) 610.5-1990

(2) An ordered sequence of zero or more bits. (C/PA) 1224-1993, 1327-1993, 1328-1993

bit stuffing A method to insert extra bits in a bit stream to achieve transparency throughout the bit stream. (C) 610.7-1995

bit time The duration of one bit as transferred to and from the MAC. The bit time is the reciprocal of the bit rate. For example, for 100BASE-T the bit rate is 10^{-8} s or 10 ns. (C/LM) 802.3u-1995, 8802-3-1993s

bit transfer rate *See:* bit rate.

BIU *See:* bus interface unit.

BIXIT *See:* bus implementation extra information for testing.

BIXIT pro forma *See:* bus implementation extra information

black Pertains to the parts of a computer or communications system in which data being transmitted or manipulated is encrypted. *Contrast:* red. (C) 610.7-1995

black and white *See:* monochrome.

blackbody (1) (fiber optics) A totally absorbing body (which reflects no radiation). *Note:* In thermal equilibrium, a blackbody absorbs and radiates at the same rate; the radiation will just equal absorption when thermal equilibrium is maintained. *See also:* emissivity. (Std100) 812-1984w

(2) (A) ([planckian] locus [illuminating engineering]) The locus of points on a chromaticity diagram representing the chromaticities of blackbodies having various (color) temperatures. **(B) (illuminating engineering)** A temperature radiator of uniform temperature whose radiant exitance in all parts of the spectrum is the maximum obtainable from any temperature radiator at the same temperature. Such a radiator is called a blackbody because it will absorb all the radiant energy that falls upon it. All other temperature radiators may be classed as nonblackbodies. They radiate less in some or all wavelength intervals than a blackbody of the same size and the same temperature. *Note:* The blackbody is practically realized over limited solid angles in the form of a cavity with opaque walls at a uniform temperature and with a small opening for observation purposes. (EEC/IE) [126]

black box (A) A system or component whose inputs, outputs, and general function are known but whose contents or implementation are unknown or irrelevant. *See also:* encapsulation. **(B)** Pertaining to an approach that treats a system or component as in definition (A). *Contrast:* glass box. *See also:* encapsulation. (C) 610.12-1990

black box model A model whose inputs, outputs, and functional performance are known, but whose internal implementation is unknown or irrelevant; for example, a model of a computerized change-return mechanism in a vending machine, in the form of a table that indicates the amount of change to be returned for each amount deposited. *Synonyms:* behavioral model; input/output model. *Contrast:* glass box model. (C) 610.3-1989

black-box testing *See:* functional testing.

black compression (television) The reduction in gain applied to a picture signal at those levels corresponding to dark areas in a picture with respect to the gain at that level corresponding to the mid-range light value in the picture. *Note:* (1) The gain referred to in the definition is for a signal amplitude small in comparison with the total peak-to-peak picture signal involved. A quantitative evaluation of this effect can be obtained by a measurement of differential gain. (2) The overall effect of black compression is to reduce contrast in the low lights of the picture as seen on a monitor. *Synonym:* black saturation. *See also:* television. (BT) [34]

black level (television) The level of the picture signal corresponding to the maximum limit of black peaks. *See also:* television. (BT) [34]

black light (illuminating engineering) The popular term for ultraviolet energy near the visible spectrum. *Note:* For engineering purposes the wavelength range 320–400 nm (nanometers) has been found useful for rating lamps and their effectiveness upon fluorescent materials (excluding phosphors used in fluorescent lamps). By confining "black light" applications to this region, germicidal, and erythemal effects are, for practical purposes, eliminated. (EEC/IE) [126]

black light flux (illuminating engineering) Radiant flux within the wavelength range 320–400 nm (nanometers). It is usually measured in milliwatts. *Note:* The fluoren is used as a unit of "black light" flux and is equal to one milliwatt of radiant flux in the wavelength range 320–400 nm. Because of the variability of the spectral sensitivity of materials irradiated by "black light" in practice, no attempt is made to evaluate "black light" flux according to its capacity to produce effects. (EEC/IE) [126]

black light flux density (illuminating engineering) "Black light flux" per unit area of the surface being irradiated. It is

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passive concentrator A type of token ring concentrator that contains no active elements in the signal path of any lobe port. Embedded repeater functions may be provided by the ring in and ring out port. (C/LM) 8802-5-1995

passive data dictionary A data dictionary that is only a repository for data definitions. *Note:* No active measures are taken to ensure that the data dictionary is consistent with the data items actually used in the system. *Synonym:* stand-alone data dictionary. *Contrast:* active data dictionary. (C) 610.5-1990

passive device A device that does not require power and contains no active components. The term encompasses taps, directional couplers, splitters, power inserters, and in-line equalizers. (C/LM) 802.7-1989

passive electric network An electric network containing no source of energy. *See also:* network analysis. (EEC/PE) [119]

passive fire protection The selection of materials that resist ignition and fire propagation, and produce low levels of fire products. (DEI) 1221-1993

passive graphics A method of operation of a computer graphics system in which the graphics system does not accept input from a user and does not allow the user to influence its processing while it is in progress. *Contrast:* interactive graphics. (C) 610.6-1991

passive homing guidance (navigation aid terms) Guidance in which a craft or missile is directed toward a destination by means of natural radiation from the destination. (AE) 172-1983w

passive limiter (nonlinear, active, and nonreciprocal waveguide components) A nonlinear device that suppresses input radio-frequency (rf) power without the aid of an external bias. (MTT) 457-1982w

passive satellite (communication satellite) A communication satellite that is a reflector and performs no active signal processing. (COM) [24]

Passive-Star Coupler A component of a 10BASE-FP fiber optic mixing segment that divides optical power received at any of N input ports among all N output ports. The division of optical power is approximately uniform. (C/LM) 802.3u-1995

passive station (data transmission) All stations on a multipoint network, other than the master and slave(s), that, during the information message transfer state, monitor the line for supervisory sequences, ending characters, etc. (PE) 599-1985w

passive test (test, measurement, and diagnostic equipment) A test conducted upon an equipment or any part thereof when the equipment is not energized. *Synonym:* cold test. (MIL) [2]

passive transducer *See:* transducer, passive.

passivity (A) (chemical) The condition of a surface that retards a specified chemical reaction at that surface. *See also:* electrochemistry. **(B) (electrolytic or anodic)** Such a condition of an anode that the normal anodic reaction is retarded. *See also:* electrochemistry. (EEC/PE) [119]

paste (dry cell) (primary cell) A gelatinized layer containing electrolyte that lies adjacent to the negative electrode. *See also:* electrolytic cell. (EEC/PE) [119]

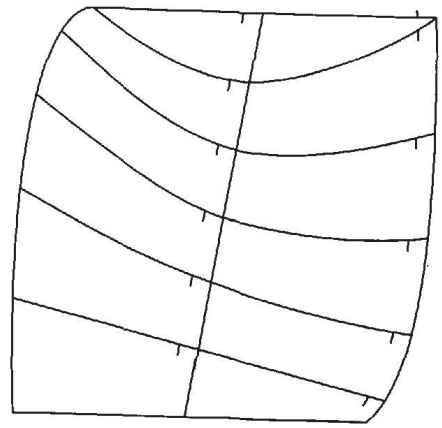
pasted sintered plate (alkaline storage battery) A plate consisting of fritted metal powder in which the active material is impregnated. *See also:* battery. (EEC/PE) [119]

patch (1) To connect circuits together temporarily by means of a cord, known as a patch cord. (EEC/PE) [119]

(2) (computers) To modify a routine in a rough or expedient way. (C) [20], [85]

(3) (A) (software) A modification made directly to an object program without reassembling or recompiling from the source program. **(B) (software)** A modification made to a source [illegible] erthought. **(C) (software)** [illegible] to a source or object program. **(D) (software)** To perform a modification as in definitions (A), (B), or (C). (C) 610.12-1990

(4) (computer graphics) A portion of the surface of a three-dimensional object, as displayed on a graphical display device. (See the corresponding figure.)



patch

(C) 610.6-1991

patch bay (1) (analog computer) In an analog computer, a concentrated assembly of the inputs and outputs of computing elements, control elements, tie points, reference voltages, and ground points that offers a means of electrical connection. (C) 165-1977w

(2) A specially designed rewireable panel that allows its user to dynamically rewire or perform analog programming. *Synonym:* wiring panel. (C) 610.10-1994

patch board A specially designed reconfigurable connection board used to prototype or test integrated circuits. *Synonym:* patch panel. *See also:* problem board. (C) 610.10-1994

patchcord (test, measurement, and diagnostic equipment) An interconnecting cable for plugging or patching between terminals; commonly employed on patchboard, plugboard, and in maintenance operations. (MIL) [2]

patch cord Flexible cable unit or element with connectors(s) used to establish connections on a patch panel. (C/LM) 802.3u-1995

patch panel *See:* problem board; electronic analog computer.

path (1) (navigation) (navigation aid terms) A line connecting a series of points in space and constituting a proposed or traveled route. *See also:* course line; flight path; flight track. (AE) 172-1983w

(2) (network analysis) Any continuous succession of branches, traversed in the indicated branch directions. (CAS) 155-1960r

(3) (data transmission) *See also:* channel. (PE) 599-1985w

(4) (telephone switching systems) The set of links and junctors joined in series to establish a connection. (COM) 312-1977w

(5) (A) (telecommunications switching systems) A continuous physical connection. **(B) (telecommunications switching systems)** A time slot in a shared facility. (COM) 973-1990w

(6) (A) (software) In software engineering, a sequence of instructions that may be performed in the execution of a computer program. **(B) (software)** In file access, a hierarchical sequence of directory and subdirectory names specifying the storage location of a file. (C) 610.12-1990

(7) In the critical path method, any sequence of activities that goes from the beginning to the end of a project. (C) 610.2-1987

(8) (A) (data management) In a hierarchical database, a sequence of segments encountered in traversing from the root segment to an individual dependent segment. **(B) (data management)** With respect to a network or graph, some sequence that each successive node is connected to its

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pool rectifier A gas-filled rectifier with a pool cathode, usually mercury. (ED) [45], [84]

pool tube A gas tube with a pool cathode. *See also:* electronic controller. (ED) [45]

POP *See:* point of presence.

pop *See:* pull.

populate *See:* load.

population (1) (data management) The number of records in a file or database. (C) 610.5-1990

(2) (utility power systems) Transformers that have given common specific characteristics. (PE) C57.117-1986r

population, conceptual (results from a measurement process) The set of measurements that would result from infinite repetition of a measurement process in a state of statistical control. (IM) 470-1972w

population inversion (laser maser) A nonequilibrium condition of a system of weakly interacting particles (electronics, atoms, molecules, or ions) which exists when more than one-half of the particles occupy the higher of two energy states. (LEO) 586-1980w

popup menu A menu that appears outside of menu bar when requested, usually as the result of pressing BMenu or KMenu. (C) 1295-1993

pores (electroplating) Micro discontinuities in a metal coating that extend through to the base metal or underlying coating. *See also:* electroplating. (LEO) 586-1980w

port (1) (electronic devices or networks) A place of access to a device or network where energy may be supplied or withdrawn or where the device or network variables may be observed or measured. *Notes:* 1. In any particular case, the ports are determined by the way the device is used and not by its structure alone. 2. The terminal pair is a special case of a port. 3. In the case of a waveguide or transmission line, a port is characterized by a specified mode of propagation and a specified reference plane. 4. At each place of access, a separate port is assigned to each significant independent mode of propagation. 5. In frequency changing systems, a separate port is also assigned to each significant independent frequency response. *See also:* network analysis; optoelectronic device; waveguide. (ED/IM) [40], [45], [46]

(2) (rotating machinery) An opening for the intake or discharge of ventilating air. (PE) [9]

(3) (rotating machinery) (for a waveguide component) A means of access characterized by a specified reference plane and a specified propagating mode in a waveguide which permits power to be coupled into or out of a waveguide component. *Notes:* 1. At low frequencies the port is synonymous with a terminal pair. 2. To each propagating mode at a specified reference plane there corresponds a distinct port. (MTT) 146-1980w

(4) A segment or IRL interface of a repeater unit. (C/LM) 802.3u-1995

(5) (broadband local area networks) An electrical interface that has defined operating boundaries. The specific references within IEEE Std 802.7-1989 assume ports to be 75 Ω transmission line interfaces that have an associated connector to which the signals pass. (C/LM) 802.7-1989

(6) A source or destination of data transferred by a Data Transfer class command into and/or out of an S-module. A port may be an on-module memory, on-module interface, a peripheral attached to a module, or some other mechanism to/from which data is passed.Within IEEE Std 1149.5-1995, a port is defined by a module address, a port ID meaningful to the MTM-Bus interface logic of that module, and the semantics and structure of packets by which data can be conveyed to and/or from that port. This latter often entails some description of the application to/from which data are passed. A port is selected/accessed/addressed via a Data Transfer class command. (C/TT) 1149.5-1995

(7) The physical interconnection point or an access point for (C) 610.7-1995

(8) An input or output connection between a peripheral device and a computer. *See also:* input-output port; mouse port; parallel port; serial port. (C) 610.10-1994

(9) A physical layer entity in a node that connects to either a cable or backplane and provides one end of a physical connection with another node. (C/MM) 1394-1995

(10) A signal interface provided by token ring stations, passive concentrator lobes, active concentrator lobes, or concentrator trunks that is generally terminated at a media interface connector (MIC). Ports may or may not provide physical containment of channels. *See also:* Bridge Port. (C/LM) 802.1G-1996, 8802-5-1995

(11) *See also:* link interface. (BA/C) 1355-1995

(12) *See also:* Bridge Port. (C/LM) 802.1G-1996

portability (1) (software) The ease with which a system or component can be transferred from one hardware or software environment to another. *Synonym:* transportability. *See also:* machine independent. (C) 610.12-1990

(2) (application software) The ease with which application software and data can be transferred from one application platform to another. (C/PA) 14252-1996

(3) The capability of being moved between differing environments without losing the ability to be applied or processed. (ATL) 1232-1995

portable (x-ray) X-ray equipment designed to be hand-carried. (NEC/NESC) [86]

portable appliance An appliance which is actually moved or can easily be moved from one place to another in normal use. For the purpose of this article, the following major appliances other than built-in are considered portable if cord-connected; refrigerators, gas range equipment, clothes washers, dishwashers without booster heaters, or other similar appliances. (NEC/NESC) [86]

portable battery A storage battery designed for convenient transportation. *See also:* battery. (EEC/PE) [119]

portable character set The set of characters described in 2.4 that is supported on all conforming systems. This term is contrasted against the smaller *portable filename character set.* (C/PA) 9945-2-1993

portable character string A sequence of characters from the portable character set. Within software definition files of exported catalogs, all such strings shall be encoded using IRV. (C/PA) 1387.2-1995

portable computer A personal computer that is designed and configured to permit transportation as a piece of handheld luggage. *Note:* U.S. Federal regulations limit use of the term "portable" to objects weighing no more than 21 pounds. *See also:* hand-held computer; laptop computer; notebook computer; transportable computer. (C) 610.10-1994, 610.2-1987

portable concentric mine cable A double-conductor cable with one conductor located at the center and with the other conductor strands located concentric to the center conductor with rubber or synthetic insulation between conductors and over the outer conductor. *See also:* mine feeder circuit. (EEC/PE) [119]

portable filename character set The set of characters from which portable filenames are constructed. For a filename to be portable across conforming implementations of this standard, it shall consist only of the following characters:

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

a b c d e f g h i j k l m n o p q r s t u v w x y z

0 1 2 3 4 5 6 7 8 9 . _ -

The last three characters are the period, underscore, and hyphen characters, respectively. The hyphen shall not be used as the first character of a portable filename. Upper- and lowercase letters shall retain their unique identities between conforming implementations. In the case of a portable pathname, the slash character may also be used. (C/PA) 1003.5-1992, 1003.5b-1995, 9945-1-1996, 9945-2-1993

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arranged in a n-vector form a state vector. The mathematical model of the system may be manipulated into the form

$(dx)/(dt) = \dot{X} = AX + bu$

$Y = CX + bu$

where X is the system state vector, u is the input vector, Y is the output vector, and A, b, C, d are matrices of appropriate dimension which specify the system. Such a model is known as a state variable or modern control formulation.

$\det(A - \lambda I) = 0$

is called the characteristic equation and has n roots which are called eigenvalues (det (·) denotes determinant). When eigenvalues are real, they are the negative inverses of closed loop system time constants. Eigenvalues are also the pole locations of the closed loop transfer function. Any vector e_i such that

$(A - \lambda_i I)e_i = 0$

$\|e_i\| \neq 0$

is called an eigenvector of the eigenvalue λ_i($\|\cdot\|$) denotes the square root of the sum of the squares of all entries of a vector. All n eigenvectors of a system form a modal matrix of matrix A when arranged side-by-side in a square matrix. The modal matrix is used in certain analytic procedures in modern control theory whereby large, complex systems are decoupled into many first order systems. (PE) 421A-1978s

state variables (automatic control) Those whose values determine the state. (PE) [3]

state vector (automatic control) One whose components are the state variables. (PE) [3]

static (1) (atmospherics) Interference caused by natural electric disturbances in the atmosphere, or the electromagnetic phenomena capable of causing such interference. *See also:* radio transmitter. (EEC/PE) [119]

(2) (adjective) (automatic control) Referring to a state in which a quantity exhibits no appreciable change within an arbitrarily long time interval. (PE) [3]

(3) (software) Pertaining to an event or process that occurs without computer program execution; for example, static analysis, static binding. *Contrast:* dynamic. (C) 610.12-1990

static accuracy (analog computer) Accuracy determined with a constant output. (C) 165-1977w

static analysis (software) The process of evaluating a system or component based on its form, structure, content, or documentation. *Contrast:* dynamic analysis. *See also:* inspection; walk-through. (C) 610.12-1990

static analyzer (software) A software tool that aids in the evaluation of a computer program without executing the program. Examples include syntax checkers, compilers, cross-reference generators, standards enforcers, and flowcharters. *See also:* compiler; computer program; dynamic analyzer; program; syntax. (C/SE) 729-1983s

static binding (software) Binding performed prior to the execution of a computer program and not subject to change during program execution. *Contrast:* dynamic binding. (C) 610.12-1990

static breakpoint A breakpoint that can be set at compile time, such as entry into a given routine. *See also:* code breakpoint; data breakpoint; epilog breakpoint; programmable breakpoint; prolog breakpoint. (C) 610.12-1990

static breeze *See:* convective discharge.

static characteristic (electron tube) A relation, usually represented by a graph, between a pair of variables such as electrode voltage and electrode current, with all other voltages maintained constant. (ED) [45]

static characteristic, relay *See:* relay static characteristic.

static charge Any electric charge at rest, e.g., charge on capacitor. Static charge is often loosely used to describe discharge conditions resulting from electric field coupling. (PE/T&D) 1048-1990, 524a-1993

static converter (electric installations on shipboard) A unit that employs static rectifier devices such as semiconductor rectifiers or controlled rectifiers (thyristors) transistors, electron tubes, or magnetic amplifiers to change ac power to dc power or vice-versa. (IA) 45-1983r

static dissipative Having a level of resistivity that typically leads to charge dissipation. (PE/PSPD) C62.47-1992

static dump (1) (software) A dump that is produced before or after the execution of a computer program. *Contrast:* dynamic dump. *See also:* change dump; memory dump; postmortem dump; selective dump; snapshot dump. (C) 610.12-1990

(2) (computers) A dump that is performed at a particular point in time with respect to a machine run, frequently at the end of a run. (C) [20], [85]

static electrode potential The electrode potential that exists when no current is flowing between the electrode and the electrolyte. *See also:* electrolytic cell. (EEC/PE) [119]

static error (software) An error that is independent of the time-varying nature of an input. *Contrast:* dynamic error. (C) 165-1977w, 610.12-1990

static exciter Nonrotating source of direct current for the synchronous generator field, utilizing controlled rectifiers. (PE) 1020-1988r

static friction *See:* stiction.

static induced current The charging and discharging current of a pair of Leyden jars or other capacitors, which current is passed through a patient. *See also:* electrotherapy. (EMB) [47]

staticize (A) (electronic digital computation) To convert serial or time-dependent parallel data into static form. **(B) (electronic digital computation)** Occasionally, to retrieve an instruction and its operands from storage prior to its execution. (C) 162-1963w

staticizer (electronic computation) A storage device for converting time-sequential information into static parallel information. (Std100) 270-1966w

static Kraemer system (rotating machinery) A system of speed control below synchronous speed for wound-rotor induction motors. Slip power is recovered through the medium of a static converter equipment electrically connected between the secondary winding of the induction motor and a power system. *See also:* asynchronous machine. (PE) [9]

static load line The locus of all simultaneous average values of output electrode current and voltage, for a fixed value of direct-current load resistance. (ED) [45]

static magnetic cell *See:* magnetic cell.

static method A method that can be executed without an instance of its package. (BA/C) 1275-1994

static model A model of a system in which there is no change; for example, a scale model of a bridge, studied for its appearance rather than for its performance under varying loads. *Contrast:* dynamic model. (C) 610.3-1989

static noise (atmospherics) (telephone practice) Interference caused by natural electric disturbances in the atmosphere, or the electromagnetic phenomena capable of causing such interference. *See also:* static. (PE) C37.93-1976s

static optical transmission (acousto-optic device) The ratio of the transmitted zero order intensity, I_0, to the incident light intensity, I_{in}, when the acoustic drive power is off: thus $T = I_0/I_n$. (UFFC) [23]

static overvoltage (surge arresters) An overvoltage due to an electric charge on an isolated conductor or installation. (PE) [8]

static phase offset The constant difference between the phase of the recovered clock and the optimal sampling position of the received data. (C/LM) 802.5-1989s

static plow (cable plowing) A plowing unit that depends upon drawbar pull only for its movement through the soil. (PE/T&D) 590-1977r

static power converter Any static power converter with con-

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transfer trip A form of remote trip in which a communication channel is used to transmit a trip signal from the relay location to a remote location. (PE/SWG) C37.100-1992

transform analysis A software development technique in which the structure of a system is derived from analyzing the flow of data through the system and the transformations that must be performed on the data. *Synonyms:* transform-centered design; transformation analysis. *See also:* data structure-centered design; input-process-output; modular decomposition; object-oriented design; rapid prototyping; stepwise refinement; structured design; transaction analysis. (C) 610.12-1990

transformation A segment attribute that determines the translation, scaling, and rotation applied to a segment when it is displayed on a display surface. (C) 610.6-1991

transformation analysis *See:* transform analysis.

transformation function A mapping function that performs graphical coordinate transformations such as scaling, rotation, and translation. (C) 610.6-1991

transform-centered design *See:* transform analysis.

transformer (1) A device, which when used, will raise or lower the voltage of alternating current of the original source. (NEC/NESC) [86]

(2) (power and distribution transformers) A static electric device consisting of a winding, or two or more coupled windings, with or without a magnetic core, for introducing mutual coupling between electric circuits. Transformers are extensively used in electric power systems to transfer power by electromagnetic induction between circuits at the same frequency, usually with changed values of voltage and current. (PE) C57.12.80-1978r

(3) (failure data for power transformers and shunt reactors) A static electric device consisting of a winding, or two or more coupled windings, with or without a magnetic core, for introducing mutual coupling between electric circuits. *Note:* The transformer includes all transformer-related components, such as bushings, LTCs, fans, temperature gauges, etc, and excludes all system-related components, such as surge arresters, grounding resistors, high voltage switches, low-voltage switches, and house service equipment. (PE) C57.117-1986r

(4) An inductive electrical device which uses electromagnetic energy to transform voltage and current levels within a circuit. (C) 610.10-1994

(5) *See also:* dry-type encapsulated water-cooled transformer; dry-type transformer; liquid-filled, or liquid-cooled transformer; transformer coupled. (IA) 668-1987w

transformer, alternating-current arc welder A transformer with isolated primary and secondary windings and suitable stabilizing, regulating, and indicating devices required for transforming alternating current from normal supply voltages to an alternating-current output suitable for arc welding. (EEC) [91]

transformer category definitions (distribution, power and regulating transformers) *Note:* All kVA ratings are minimum nameplate kVA for the principal windings. Category I includes distribution transformers manufactured in accordance with ANSI C57.12.20-1974, Requirements for Overhead-Type Distribution Transformers 67 000 Volts and Below; 500 kVA and Smaller, up through 500 kVA, single phase or three phase. In addition, autotransformers of 500 equivalent two-winding kVA or less that are manufactured as distribution transformers in accordance with ANSI C57.12.20-1974 are included in Category I, even through their nameplate kVAs may exceed 500. (PE) C57.12.00-1987s

transformer class designations *See:* transformer, oil-immersed.

transformer, constant-voltage *See:* constant-voltage transformer.

transformer correction factor (TCF) The ratio of the true red secondary watts or watthours, divided by the marked ratio. *Note:* The transformer correction factor for a current or voltage transformer is the ratio correction factor multiplied by the phase angle correction factor for a specified primary circuit power factor. The true primary watts or watthours are equal to the watts or watthours measured, multiplied by the transformer correction factor and the marked ratio. The true primary watts or watthours, when measured using both current and voltage transformers, are equal to the current transformer ratio correction factor multiplied by the voltage transformer ratio correction factor multiplied by the marked ratios of the current and voltage transformers multiplied by the observed watts or watthours. It is usually sufficiently accurate to calculate true watts or watthours as equal to the product of the two transformer correction factors multiplied by the marked ratios multiplied by the observed watts or watthours. (PE) [57], C57.12.80-1978r, C57.13-1993

transformer coupled (electrical heating applications to melting furnaces and forehearths in the glass industry) The power modulation device is connected in the primary circuit of a transformer whose secondary circuit is connected to the glass. (IA) 668-1987w

transformer, dry-type *See:* dry-type transformer.

transformer, energy-limiting A transformer that is intended for use on an approximately constant-voltage supply circuit and that has sufficient inherent impedance to limit the output current to a thermally safe maximum value. *See also:* transformer, specialty. (PE) [57]

transformer equipment rating A volt-ampere output together with any other characteristics, such as voltage, current, frequency, and power factor, assigned to it by the manufacturer. *Note:* It is regarded as a test rating that defines an output that can be taken from the item of transformer equipment without exceeding established temperature-rise limitations, under prescribed conditions of test and within the limitations of established standards. *See also:* duty. (PE) [57]

transformer, grounding *See:* grounding transformer.

transformer grounding switch and gap (capacitance potential devices) Consists of a protective gap connected across the capacitance potential device and transformer unit to limit the voltage impressed on the transformer and the auxiliary or shunt capacitor, when used; and a switch that when closed removes voltage from the potential device to permit adjustment of the potential device without interrupting high-voltage line operation and carrier-current operation when used. *See also:* outdoor coupling capacitor. (PE) 43-1974r

transformer, group-series loop insulating An insulating transformer whose secondary is arranged to operate a group of series lamps and/or a series group of individual-lamp transformers. *See also:* transformer, specialty. (PE) [57]

transformer, high-power-factor A high-reactance transformer that has a power-factor-correcting device such as a capacitor, so that the input current is at a power factor of not less than 90% when the transformer delivers rated current to its intended load device. *See also:* transformer, specialty. (PE) [116]

transformer, high-reactance (1) (output limiting) An energy-limiting transformer that has sufficient inherent reactance to limit the output current to a maximum value. *See also:* transformer, specialty. (PE) [57]

(2) (secondary short-circuit current rating) The current in the secondary winding when the primary winding is connected to a circuit of rated primary voltage and frequency and when the secondary terminals are short-circuited. *See also:* transformer, specialty. (PE) [57]

(3) (kilovolt-ampere or voltampere short-circuit input rating) The input kilovolt-amperes or volt-amperes at rated primary voltage with the secondary terminals short-circuited. *See also:* transformer, specialty. (PE) [57]

transformer, ideal A hypothetical transformer that neither stores nor dissipates energy. *Note:* An ideal transformer has the following properties: Its self and mutual impedances are

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