

IEEE 100

THE
AUTHORITATIVE
DICTIONARY
OF IEEE STANDARDS TERMS

SEVENTH EDITION



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The Authoritative Dictionary of
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Seventh Edition



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How to Use This Dictionary

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 If a standard designation is followed by the letter *s*, it means that edition of the standard was superseded by a newer revision and the term was not included in the revision. If a designation is followed by the letter *w*, it means that edition of the standard was withdrawn and not replaced by a revision.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

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 the Dictionary 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.

Categories sorted by abbreviation

AES	aerospace and electronic systems
AHDL	computer—Analog Hardware Descriptive Language
AMR	automatic meter reading and energy management
AP	antennas and propagation
ATL	computer—Abbreviated Test Language for All Systems
BA	computer—bus architecture
BT	broadcast technology
C	computer
CAS	circuits and systems
CE	consumer electronics
CHM	components, hybrids, and manufacturing technology
COM	communications
CS	control systems
DA	computer—design automation
DEI	dielectrics and electrical insulation
DESG	dispersed energy storage and generation
DIS	computer—distributed interactive simulation
ED	electron devices
EDU	education
EEC	electrical equipment and components
ELM	electricity metering
EM	engineering management
EMB	engineering in medicine and biology
EMC	electromagnetic compatibility
GRS	geoscience and remote sensing
GSD	graphic symbols and designations
IA	industry applications
IE	industrial electronics
II	information infrastructure
IM	instrumentation and measurement
IT	information theory

IVHS	intelligent vehicle highway systems
LEO	lasers and electro-optics
LM	computer—local and metropolitan area networks
MAG	magnetics
MIL	military
MM	computer—microprocessors and microcomputers
MTT	microwave theory and techniques
NEC	National Electrical Code
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
NI	nuclear instruments
NIR	non-ionizing radiation
NN	neural networks
NPS	nuclear and plasma sciences
ODM	computer—optical disk and multimedia platforms
OE	oceanic engineering
PA	computer—portable applications
PE	power engineering
PEL	power electronics
PQ	power quality
PSPD	power surge protective devices
PV	photovoltaics
QUL	quantities, units, and letter symbols
R	reliability
RA	robotics and automation
REM	rotating electrical machinery
RL	roadway lighting
S&P	computer—security and privacy
SB	stationary batteries
SE	computer—software engineering
SMC	systems, man, and cybernetics
SP	signal processing
Std100	Standard 100 legacy data
SUB	substations
SWG	power switchgear
T&D	transmission and distribution
TF	time and frequency
TRR	transformers, regulators, and reactors
TT	test technology
UFFC	ultrasonics, ferroelectrics, and frequency control
VT	vehicular technology

Categories sorted by name

aerospace and electronic systems	AES
antennas and propagation	AP
automatic meter reading and energy management	AMR
broadcast technology	BT
circuits and systems	CAS
communication	COM
components, hybrids, and manufacturing technology	CHM
computer	C
computer—Abbreviated Test Language for All Systems	ATL
computer—Analog Hardware Descriptive Language	AHDL
computer—bus architecture	BA
computer—design automation	DA
computer—distributed interactive simulation	DIS
computer—local and metropolitan area networks	LM
computer—microprocessors and microcomputers	MM
computer—optical disk and multimedia platforms	ODM
computer—portable applications	PA
computer—security and privacy	S&P
computer—software engineering	SE
consumer electronics	CE

counter, radiation See: radiation counter.

counter tube (A) (externally quenched) A radiation-counter tube that requires the use of an external quenching circuit to inhibit reignition. **(B)** (gas-filled) A gas tube used for detection of radiation by means of gas ionization. **(C)** (gas-flow) A radiation-counter tube in which an appropriate gas-fill concentration is maintained by a flow of gas through the tube. **(D)** (Geiger-Mueller) A radiation-counter tube operated in the Geiger-Mueller region. **(E)** (self-quenched) A radiation-counter tube in which reignition of the discharge is inhibited by internal processes. (NI/NPS) 309-1999

counting channel (liquid-scintillation counting) A region of the pulse-height spectrum that is defined by upper and lower boundaries set by discriminators. (NI) N42.15-1990

counting efficiency (1) (radiation counter tubes) The average fraction of the number of ionizing particles or quanta incident on the sensitive area that produce tube counts. *Note:* The operating conditions of the counter and the condition of irradiation must be specified. (ED) 161-1971w

(2) (scintillation counters) The ratio of the average number of photons or particles of ionizing radiation that produce counts to the average number incident on the sensitive area. *Note:* The operating conditions of the counter and the conditions of irradiation must be specified. See also: scintillation counter. (NPS) 398-1972r

(3) (liquid-scintillation counting) The ratio of the count rate to the disintegration rate, usually expressed as a percentage:

$$E = (R/A) \times 100.$$

E = counting system efficiency

R = net count rate in an individual measurement, counts per minute

A = activity of the radionuclide contained in the check source. (NI) N42.15-1990

(4) The ratio of the number of observed counts to the total number of ionizing particles impinging upon the counter surface when the counting rate is so low that dead-time correction is unnecessary. (NI/NPS) 309-1999

counting mechanism (of an automatic line sectionalizer or automatic circuit recloser) A device that counts the number of electrical impulses and, following a predetermined number of successive electrical impulses, actuates a releasing mechanism. It resets if the total predetermined number of successive impulses do not occur in a predetermined time. (SWG/PE) C37.100-1992

counting operation (of an automatic line sectionalizer or automatic circuit recloser) Each advance of the counting mechanism towards an opening operation. (SWG/PE) C37.100-1992

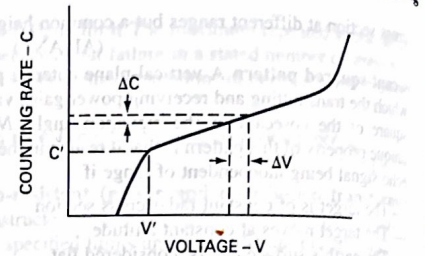
counting operation time (of an automatic line sectionalizer) The time between the cessation of a current above the minimum actuating current value and the completion of a counting operation. (SWG/PE) C37.100-1992

counting rate (1) Number of counts per unit time. See also: anticoincidence. (ED) [45]

(2) (germanium spectrometers) The rate at which detector pulses are being registered in a selected voltage interval. The unit is reciprocal seconds (i.e., s^{-1}). (NI) N42.14-1991

counting-rate meter (pulse techniques) A device that indicates the time rate of occurrence of input pulses averaged over a time interval. See also: scintillation counter. (NPS) 398-1972r

counting rate versus voltage characteristic (gas-filled radiation counter tube) The counting rate as a function of applied voltage for a given constant average intensity of radiation.



Counting rate-voltage characteristic in which

$$\text{relative plateau slope} = 100 \frac{\Delta C/C}{\Delta V}$$

$$\text{normalized plateau slope} = \frac{\Delta C/\Delta V}{C/V'} = \frac{\Delta C/C'}{\Delta V/V'}$$

counting rate versus voltage characteristic

(ED/NI/NPS) 161-1971w, 309-1999

counting region A region that identifies the first and last memory location of a contiguous series to be summed in a multichannel analyzer. (NI) N42.15-1990

country beam See: upper (driving) beams.

country code (telephone switching systems) The one-, two-, or three-digit number that, in the world numbering plan, identifies each country or integrated numbering plan area in the world. The initial digit is always the world-zone number. Any subsequent digits in the code further define the designated geographical area normally identifying a specific country. On an international call, this code is dialed ahead of the national number. (COM) 312-1977w

counts, tube, multiple See: multiple tube counts.

counts, tube, spurious See: spurious tube counts.

couple (1) (storage cell) An element of a storage cell consisting of two plates, one positive and one negative. *Note:* The term couple is also applied to a positive and a negative plate connected together as one unit for installation in adjacent cells. See also: battery. (PE/EEC) [119]

(2) (thermoelectric) A thermoelectric device having two arms of dissimilar composition. *Note:* The term thermoelement is ambiguously used to refer to either a thermoelectric arm or to a thermoelectric couple, and its use is therefore not recommended. See also: thermoelectric device. (ED) [46]

coupled line A transmission line with multiple guiding members whose propagating waves interact with each other. (MTT) 1004-1987w

coupled modes (fiber optics) Modes whose energies are shared. See also: mode. (Std100) 812-1984w

coupler (1) (navigation aid terms) That portion of a navigational system which receives signals of one type from a sensor and transmits signals of a different type to an actuator. See also: autopilot coupler. (AES/GCS) 172-1983w

(2) (surge testing for equipment connected to low-voltage ac power circuits) A device, or combination of devices, used to feed a surge from a generator to powered equipment while limiting the flow of current from the power source into the generator. See also: coupling network. (SPD/PE) C62.45-1992

(3) (fiber optics) See also: optical waveguide coupler. 812-1984w

coupler interface That facility of a basic operating unit that is designed to provide convenient connection to, and disconnection from, any other basic operating unit without requiring disassembly of any constituent part of either basic operating unit. This includes standardized mechanical, electrical, electronic, pneumatic, and other interfaces as required. (VT) 1473-1999

coupler, optical See: optical directional coupler.

coupling (1) (ground systems) The association of two or more circuits or systems in such a way that power or signal information may be transferred from one to another. *Note:* Coupling is described as close or loose. A close-coupled process has elements with small phase shift between specified variables.

bles; close-coupled systems have large mutual effect shown mathematically by cross-products in the system matrix.

(PE/PSIM) 81-1983

(2) **(rotating machinery)** A part or combination of parts that connects two shafts for the purpose of transmitting torque or maintaining alignment of the two shafts. (PE) [9]

(3) **(software)** The manner and degree of interdependence between software modules. Types include common-environment coupling, content coupling, control coupling, data coupling, hybrid coupling, and pathological coupling. *Contrast:* cohesion. (C) 610.12-1990

(4) **(waveguide)** The power transfer from one transmission path to a particular mode or form in another. *Note:* Small, undesired coupling is sometimes called isolation, decoupling, or cross coupling. (MTT) 146-1980w

(5) **(instrumentation and control equipment grounding in generating stations)** The mechanism by which an interference source produces interference in a signal circuit.

(PE/EDPG) 1050-1996

(6) The mode of propagation of disturbing energy from a power system to a telecommunications system. There are three forms of coupling between the two systems: magnetic (inductive) coupling, electric (capacitive) coupling, and conductive (resistive) coupling. In addition, coupling by electromagnetic radiation exists and is associated with propagation of radiation fields, e.g., radio frequency interference (RFI), electromagnetic pulse (EMP), and corona.

(PE/PSC) 487-1992

(7) The association of two or more circuits or systems in such a way that power or signal information may be transferred from one system or circuit to another.

(IA/PE/PSE) 1100-1999, 599-1985w

coupling aperture (coupling hole, coupling slot) (waveguide components) An aperture in the bounding surface of a cavity resonator, waveguide, transmission line, or waveguide component which permits the flow of energy to or from an external circuit. (MTT) 147-1979w

coupling capacitance (1) (ground systems) The association of two or more circuits with one another by means of capacitance mutual to the circuits. (PE/PSIM) 81-1983

(2) **(interference terminology)** The type of coupling in which the mechanism is capacitance between the interference source and the signal system; that is, the interference is induced in the signal system by an electric field produced by the interference source. *See also:* interference. (IE) [43]

coupling-capacitor voltage transformer (metering) A voltage transformer comprised of a capacitor divider and an electromagnetic unit so designed and interconnected that the secondary voltage of the electromagnetic units is substantially proportional to, and in phase with, the primary voltage applied to the capacitor divider for all values of secondary burdens within the rating of the coupling-capacitor voltage transformer. (ELM) C12.1-1988

coupling coefficient (1) (coefficient of coupling) The ratio of impedance of the coupling to the square root of the product of the total impedances of similar elements in the two meshes. *Notes:* 1. Used only in the case of resistance, capacitance, self-inductance, and inductance coupling. 2. Unless otherwise specified, coefficient of coupling refers to inductance coupling, in which case it is equal to $M/(L_1 L_2)^{1/2}$, where M is the mutual inductance, L_1 the total inductance of one mesh, and L_2 the total inductance of the other. *See also:* network analysis. (IM/HFIM) [40]

(2) **(planar transmission lines)** A number used as a measure of the degree of interaction between the members of a coupled line. One commonly used definition of the coupling coefficient of a symmetrical coupled pair of transmission lines is K , a voltage or field ratio:

$$\frac{Z_{0e} - 1}{Z_{0o} + 1}$$

where Z_{0e} and Z_{0o} = even- and odd-mode characteristic impedances. (MTT) 1004-1987w

coupling coefficient, small-signal (electron stream) The ratio of (A) the maximum change in energy of an electron traversing the interaction space to (B) the product of the peak alternating gap voltage by the electronic charge. *See also:* electron emission; coupling coefficient; coupling. (ED) 161-1971w

coupling, conductance *See:* conductance coupling.

coupling efficiency (fiber optics) The efficiency of optical power transfer between two optical components. *See also:* coupling loss. (Std100) 812-1984w

coupling, electric *See:* electric coupling.

coupling factor (1) (lightning) The ratio of the induced voltage to the inducing voltage on parallel conductors. *See also:* direct-stroke protection. (T&D/PE) [10]

(2) **(directional coupler)** The ratio of the incident power fed into the main port, and propagating in the preferred direction, to the power output at an auxiliary port, all ports being terminated by reflectionless terminations. *See also:* waveguide. (IM/HFIM) [40]

(3) The ratio of the induced voltage to the inducing voltage on parallel conductors. For example, at the tower, the shield or coupling wires and tower crossarms are at practically the same potential (because of lightning stroke travel time). The stress across the insulator string is one minus the coupling factor multiplied by the tower top potential.

$$\text{Stress} = (1.0 - K_{fc}) \times V_{TT}$$

where

K_{fc} is the coupling factor

V_{TT} is the tower top voltage

(PE/SPD) C62.23-1995

coupling flange (rotating machinery) The disc-shaped element of a half coupling that permits attachment to a mating half coupling. *Synonym:* flange. *See also:* rotor. (PE) [9]

coupling function A mathematical, graphical, or tabular statement of the influence that one element or subsystem has on another element or subsystem, expressed as the effect/cause ratio of related variables or their transforms. *Note:* For a multi-terminal system described by m differential equations and having m input transforms $R_1 \dots R_m$ and m output transforms $C_1 \dots C_m$, the coupling functions consist of all effect/cause ratios which can be formed from transforms bearing unlike-numbered subscripts. (CS/PE/EDPG) [3]

coupling hole *See:* coupling aperture.

coupling, hysteresis *See:* hysteresis coupling.

coupling, inductance *See:* inductance coupling.

coupling, induction *See:* induction coupling.

coupling loop (waveguide components) A conducting loop that permits the flow of energy between a cavity resonator, waveguide, transmission line, or waveguide component and an external circuit. (MTT) 147-1979w

coupling loss (fiber optics) The power loss suffered when coupling light from one optical device to another. *See also:* lateral offset loss; insertion loss; gap loss; extrinsic joint loss; angular misalignment loss; intrinsic joint loss. (Std100) 812-1984w

coupling, magnetic friction *See:* magnetic friction coupling.

coupling, magnetic-particle *See:* magnetic-particle coupling.

coupling network Electrical circuit for the purpose of transferring energy from one circuit to another. *See also:* coupler. (SPD/PE) C62.45-1992r

coupling plane A metal plate to which discharges are applied to simulate electrostatic discharge to objects adjacent (vertically or horizontally) to the EUT. (EMC) C63.16-1993

coupling probe (waveguide components) A probe that permits the flow of energy between a cavity resonator, waveguide, transmission line, or waveguide component and an external circuit. (MTT) 147-1979w

coupling, radiation *See:* radiation coupling.