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The IEEE Standard Dictionary of Electrical and Electronics Terms

Sixth Edition



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- detecting errors within seconds defined by a clock that is independent of the error occurrence. (COM) 1007-1991
- errored second, severely** A second during which the error ratio is worse than a specified limit, or an OOF event occurs. (COM) 1007-1991
- errored second, synchronous** A one-second interval during which one or more errors are received, which is measured by triggering the one-second time period on a detected error. (COM) 1007-1991
- error, fractional (measurement)** The magnitude of the ratio of the error to the true value. (IM) 314-1971w
- error-free second** A one-second interval during which no error occurs. (COM) 1007-1991
- error, linearity (analog computer)** An error that is the deviation of the output quantity, from a specified linear reference curve. (C) 165-1977w
- error log** Memory space specifically allocated for recording errors. (BA/C) 896.3-1993
- error, logical** An error in the binary content (payload) of a digital signal; e.g., bit error. (COM) 1007-1991
- error, matching (analog computer)** An error resulting from inaccuracy in matching (two resistors) or mating (a resistor and a capacitor) passive elements. *See also:* electronic analog computer. (EEC/IE) [126]
- error model (A) (modeling and simulation) (software)** A model used to estimate or predict the extent of deviation of the behavior of an actual system from the desired behavior of the system; for example, a model of a communications channel, used to estimate the number of transmission errors that can be expected in the channel. **(B) (modeling and simulation) (software)** In software evaluation, a model used to estimate or predict the number of remaining faults, required test time, and similar characteristics of a system. *Synonym:* error prediction model. (C) 610.12-1990; 610.3-1989
- error prediction (software)** A quantitative statement about the expected number or nature of faults in a system or component. *See also:* error model; error seeding. (C) 610.12-1990
- error prediction model** *See:* error model.
- error, random (measurement)** A component of error whose magnitude and direction vary in a random manner in a sequence of measurements made under nominally identical conditions. (IM) 314-1971w
- error range** The difference between the highest and lowest error values. (C) [20], [85]
- error rate (1) (data transmission)** Ratio of the number of characters of a message incorrectly received to the number of characters of the message received. (PE) 599-1985w
- (2)** The probability of an error occurring in the course of data manipulation. For serial binary channels, the error rate is usually expressed as the "bit error rate," i.e., the probability that an individual bit will be received in error. (PE/SUB) 999-1992
- (3)** The ratio of the number of characters of a message incorrectly received to the total number of characters of the message received. (C) 610.7-1995
- error recovery** *See:* failure recovery; recovery, error.
- error report** A summary, either in full or in part, of the error log. (BA/C) 896.3-1993; 896.9-1994
- error, resolution (analog computer)** The error due to the inability of a transducer to manifest changes of a variable smaller than a given increment. (C) 165-1977w
- error seeding** The process of intentionally adding known faults to those already in a computer program for the purpose of monitoring the rate of detection and removal, and estimating the number of faults remaining in the program. *Synonyms:* bug seeding; fault seeding. *See also:* indigenous error. (C) 610.12-1990
- error signal (1) (excitation systems for synchronous machines)** In a control system the error signal is the difference between a sensing signal and a constant reference signal. *Note:* In excitation control systems sensing signals may be proportional to synchronous machine terminal voltage, the ratio of terminal voltage to frequency, active or reactive armature current, active or reactive power, power factor, terminal frequency, shaft speed, generator field voltage or field current, and exciter field voltage or field current. (PE) 421.1-1986r
- (2)** *See also:* signal, error.
- error, static (analog computer)** An error independent of the time-varying nature of a variable. (C) 165-1977w
- error strategy** Methodology targeted at dealing with temporary errors. (BA/C) 896.3-1993
- error, systematic (measurement)** The inherent bias (offset) of a measurement process or of one of its components. (IM) 314-1971w
- error tolerance** The ability of a system or component to continue normal operation despite the presence of erroneous inputs. *See also:* fault tolerance; robustness. (C) 610.12-1990
- erythema (illuminating engineering)** The temporary reddening of the skin produced by exposure to ultraviolet energy. *Note:* The degree of erythema is used as a guide to dosages applied in ultraviolet therapy. (EEC/IE) [126]
- erythema effectiveness (illuminating engineering)** The capacity of various portions of the ultraviolet spectrum to produce erythema. (EEC/IE) [126]
- erythema efficiency of radiant flux (illuminating engineering)** (for a particular wavelength) The ratio of the erythema effectiveness of that wavelength to that of wavelength 296.7 nm (nanometers), which is rated as unity. *Note:* This term formerly was called "relative erythema factor." (EEC/IE) [126]
- erythema exposure (illuminating engineering)** The product of erythema flux density on a surface and time. It usually is measured in erythema microwatt-minutes per square centimeter. *Note:* For average untanned skin a minimum perceptible erythema requires about 300 microwatt-minutes per square centimeter of radiation at 296.7 nm (nanometers). (EEC/IE) [126]
- erythema flux (illuminating engineering)** Radiant flux evaluated according to its capacity to produce erythema of the untanned human skin. It usually is measured in microwatts of ultraviolet radiation weighted in accordance with its erythema efficiency. Such quantities of erythema flux would be in erythema microwatts. *Note:* A commonly used practical unit of erythema flux is the erythema unit (EU) or E-viton (erythema) which is equal to the amount of radiant flux which will produce the same erythema effect as 10 microwatts of radiant flux at wavelength 296.7 nm (nanometers). (EEC/IE) [126]
- erythema flux density (illuminating engineering)** The erythema flux per unit area of the surface being irradiated. It is equal to the quotient of the incident erythema flux divided by the area of the surface when the flux is uniformly distributed. It usually is measured in microwatts per square centimeter of erythemally weighed ultraviolet radiation (erythema microwatts per square centimeter). *Note:* A suggested practical unit of erythema flux density is the Finsen which is equal to one E-viton per square centimeter. (EEC/IE) [126]
- ESC** *See:* escape character; escape key.
- escalator** A power-driven, inclined, continuous stairway used for raising or lowering passengers. *See also:* elevator. (EEC/PE) [119]
- escape character (ESC) (1) (computers)** A character used to indicate that the succeeding one or more characters are expressed in a code different from the code currently in use. (C) [20], [85]
- (2) (modeling and simulation)** A code extension character used, in some cases with one or more succeeding characters, to indicate by some convention or agreement that the coded

linear filtering Pulse shaping in which the filter response does not change with time. [CR = (RC)ⁿ shaping is an example of linear filtering.] (NPS) 325-1996

linear FM (chirp) The modulation in a waveform whose phase varies quadratically with frequency, and, consequently, whose frequency varies linearly with time (inside the specified envelope of the impulse response). (UFC) 1037-1992

linear FM chirp filter A chirp filter that manifests a linear delay variation with frequency. (UFC) 1037-1992

linear gate (x-ray energy spectrometers) A gate whose presence does not affect the linearity of the gated signal. (NPS) 759-1984r

linear-impedance relay A distance relay for which the operating characteristic on an $R-X$ diagram is a straight line. *Note:* It may be described by the equation $Z = K/\cos(\theta - \alpha)$ where K and α are constants and θ is the phase angle by which the input voltage leads the input current. (PE/SWG) C37.100-1992

linear interpolation (numerically controlled machines) A mode of contouring control that uses the information contained in a block to produce velocities proportioned to the distance moved in two or more axes simultaneously. (EEC/IA) [61], [74]

linearity (1) (analog computer) A property of a component describing a constant ratio of incremental cause and effect. *Proportionality* is a special case of linearity in which the straight line passes through the origin. *Zero-error reference* of a linear transducer is a selected straight-line function of the input from which output errors are measured. *Zero-based linearity* is transducer linear defined in terms of a zero-error reference where zero input coincides with zero output. (C) 165-1977w

(2) (nuclear power generating station) The closeness with which a curve of a function approximates a straight line. *See also:* control system, feedback. (IA/PE) [60], [69], 381-1977w

(3) (test, measurement, and diagnostic equipment) The condition wherein the change in the value of one quantity is directly proportional to the change in the value of another quantity. (MIL) [2]

linearity control (television) A control to adjust the variation of scanning speed during the trace interval to minimize geometric distortion. (BT) 201-1979w

linearity error (1) (analog computer) An error which is the deviation of the output quantity, from a specified linear reference curve. (C) 165-1977w

(2) (Hall effect devices) The deviation of the actual characteristic curve of a Hall generator from the linear approximation to this curve. (MAG) 296-1969w

(3) (accelerometer) (gyros) The deviation of the output from a least-squares linear fit of the input-output data. It is generally expressed as a percentage of full scale, or percent of output, or both. (AE) 528-1994

linearity error, percent of full scale (Hall effect devices) The maximum deviation, expressed as a percent of full scale, of the actual characteristic curve of a Hall effect device from the straight-line approximation to the characteristic curve derived by minimizing and equalizing the positive and negative deviations of the curve from the straight line. (MAG) 296-1969w

linearity error, percent of reading (Hall effect devices) The maximum percent deviation of the actual characteristic curve of a Hall effect device from the straight-line approximation to the curve derived by minimizing and equalizing the positive and negative percent deviations of the characteristic curve from the straight line. (MAG) 296-1969w

linearity of a multiplier (A) (analog computer) The ability of an electromechanical or electronic multiplier to generate an output voltage that varies linearly with either one of its two inputs, provided the other input is held constant. **(B) (analog computer)** The accuracy with which the above requirement

is met. Linearity of a potentiometer is the accuracy with which a potentiometer yields a linear but not necessarily a proportional relationship between the angle of rotation of its shaft and the voltage appearing at the output arm, in the absence of loading errors. (C) 165-1977w

linearity of a potentiometer The accuracy with which a potentiometer yields a linear but not necessarily a proportional relationship between the angle of rotation of its shaft and the voltage appearing at the output arm, in the absence of loading errors. *See also:* normal linearity. (C) 165-1977w

linearity of a signal (automatic control) The closeness with which its plot against the variable it represents approximates a straight line. *Note:* The property is usually expressed as a "non-linearity," for example, a maximum deviation. The straight line should be specified as drawn to give limited absolute deviation (independent linearity), to give minimum rms deviation (dependent linearity), to pass through the zero point, or to pass through both end points. (PE) [3]

linearity, programming (power supplies) The linearity of a programming function refers to the correspondence between incremental changes in the input signal (resistance, voltage, or current) and the consequent incremental changes in power-supply output. *Note:* Direct programming functions are inherently linear for the bridge regulator and are accurate to within a percentage equal to the supply's regulating ability. (AE) [41]

linearity region (instrument approach system and similar guidance systems) The region in which the deviation sensitivity remains constant within specified values. *See also:* navigation. (AE) [42]

linearity, sweep (oscilloscopes) Maximum displacement error of the independent variable between specified points on the display area. (IM) 311-1970w

linearity, vertical (oscilloscopes) The change in deflection factor of an oscilloscope as the display is positioned vertically within the graticule area. *See also:* compression; expansion. (IM) 311-1970w

linear lag *See:* lag.

linear light (illuminating engineering) A luminous signal having a perceptible physical length. (EEC/IE) [126]

linear linked list *See:* linked linear list.

linear list A list that preserves the relationship of adjacency between data items in the list. (C) 610.5-1990

linear load An electrical load device that, in steady-state operation, presents an essentially constant load impedance to the power source throughout the cycle of applied voltage. (IA/PE/T&D) 1100-1992, 1250-1995

linear magnetic current element *See:* Hertzian magnetic dipole.

linearly polarized field vector At a point in space, a field vector whose extremity describes a straight line segment as a function of time. *Note:* Linear polarization may be viewed as a special case of elliptical polarization where the axial ratio has become infinite. (AP) 145-1993

linearly polarized mode (LP) (fiber optics) A mode for which the field components in the direction of propagation are small compared to components perpendicular to that direction. *Note:* The LP description is an approximation which is valid for weakly guiding waveguides, including typical telecommunication grade fibers. *See also:* mode; weakly guiding fiber. (Std100) 812-1984w

linearly polarized plane wave A plane wave whose electric field vector is linearly polarized. (AP) 145-1993

linearly polarized wave (data transmission) (plane-polarized wave) An electromagnetic wave for which the locus of the tip of the electric field vector is a straight line in a plane orthogonal to the wave normal. (AP) 211-1990

linearly rising front-chopped impulse (chopped impulses) (high voltage testing) A voltage rising with approximately constant steepness, until it is chopped by a disruptive discharge, as described as a linearly rising front-chopped im-

property name A text string used to specify, or name, a particular property. (BA/C) 1275-1994

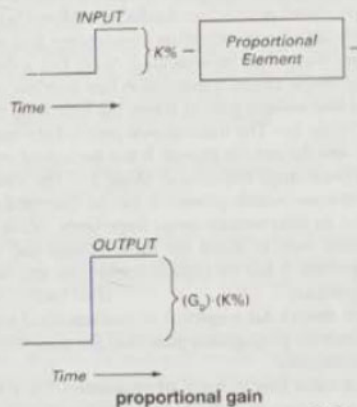
property value The data portion of a property, stored in property encoding format. (BA/C) 1275-1994

proportional amplifier An amplifier in which the output is a single value and an approximately linear function of the input over its operating range. *See also:* control system, feedback. (IA) [60]

proportional control action A control mode designed to provide a linear relationship between the controller output and input, assuming both are within normal range. *See also:* control action, proportional. (PE) 94-1991

proportional counter tube A radiation-counter tube designed to operate in the proportional region. (C) 165-1977w

proportional gain (hydraulic turbines) The proportional gain G_p of a proportional element is the ratio of the element's percent output to its percent input. A linear relationship is assumed.



(PE) 125-1977s

proportionally *See:* linearity.

proportional plus derivative control *See:* control action, proportional plus derivative.

proportional plus integral control *See:* control action, proportional plus integral.

proportional plus integral plus derivative control *See:* control action, proportional plus integral plus derivative.

proportional region (radiation counter tubes) The range of operating voltage for a counter tube in which the gas amplification is greater than unity and is independent of the amount of primary ionization. *Notes:* 1. In this region the pulse size from a counter tube is proportional to the number of ions produced as a result of the initial ionizing event. 2. The proportional region depends on the type and energy of the radiation. (ED) 161-1971w

proportional spacing Text formatting and output that takes into account the width of each character, rather than allocating the same amount of horizontal space to characters of all widths. (C) 610.2-1987

proportionate mortality ratio An index used in occupational epidemiological studies that expresses the proportion of deaths from a single cause. It is not a mortality rate and, therefore, does not necessarily indicate a risk value. Rather, it indicates within a group the relative importance of specific causes of death. (PE/T&D) 539-1990

proprietary system (protective signaling) A local system sounding and/or recording alarm and supervisory signals at a control center located within the protected premises, the control center being under the supervision of employees of the proprietor of the protected premises. *Note:* According to the United States Underwriters' rules, a proprietary system must be a recording system. *See also:* protective signaling. (EEC/PE) [119]

propulsion-control transfer switch Apparatus in the engine room for transfer of control from engine room to bridge and

vice versa. *Note:* Engine-room control is provided on all ships. Bridge control with a transfer switch is optional and is used principally on small vessels such as tugs or ferries, usually with a direct-current propulsion system. (EEC/PE) [119]

propulsion set-up switch Apparatus providing ready means to set up for operation under varying conditions where practicable; for example, cutout of one or more generators when multiple units are provided. *See also:* electric propulsion system. (EEC/PE) [119]

prorated section (metal-oxide surge arresters for ac power circuits) (surge arresters) A complete, suitably housed part of an arrester, comprising all necessary components, including gaseous medium, in such a proportion as to accurately represent, for a particular test, the characteristics of a complete arrester. (PE/PSPD) C62.1-1981s, C62.11-1993

prorated unit (arresters) A completely housed prorated section of an arrester that may be connected in series with other prorated units to construct an arrester of higher voltage rating. (PE) [8]

prospective characteristics of a test voltage causing disruptive discharge The characteristics of a test voltage that would have been obtained if no disruptive discharge had occurred. (PE) 4-1995

prospective current (1) (ac high-voltage circuit breakers) The current that would flow if it were not influenced by the circuit breaker. (PE/SWG) C37.081-1981r

(2) (available current) (surge arresters) The root-mean-square symmetrical short-circuit current that would flow at a given point in a circuit if the arrester(s) at that point were replaced by links of zero impedance. (PE) [8], [84]

prospective current of a circuit *See:* available current.

prospective crest value *See:* prospective peak value.

prospective peak value (surge arresters) (of a chopped impulse) The peak (crest) value of the full-wave impulse voltage from which a chopped impulse voltage is derived. *Synonym:* prospective crest value. (PE) [8]

prospective peak value of test voltage (switching impulse testing) The voltage that would be obtained if no disruptive discharge occurred before the crest. 332-1972w

prospective short-circuit current *See:* available (prospective) short-circuit current.

prospective (available) short-circuit current (at a given point in a circuit) The maximum current that the power system can deliver through a given circuit point to any negligible impedance short circuit applied at the given point, or at any other point that will cause the highest current to flow through the given point. *Notes:* 1. This value can be in terms of either symmetrical or asymmetrical, peak, or rms current, as specified. 2. In some resonant circuits, the maximum available short-circuit current may occur when the short-circuit is placed at some other point than the given one where the available current is measured. (PE/SWG) C37.40-1993

prospective study An epidemiological study of a group exposed to some factor over time to determine if this factor is associated with the development of a particular disease, as compared to a nonexposed control group. (PE/T&D) 539-1990

protected area (nuclear security systems) A controlled-access area encompassed by physical barriers. (PE) 692-1986

protected enclosure (electric installations on shipboard) An enclosure in which all openings are protected with wire screen, expanded metal, or perforated covers. A common form of specifications for "protected enclosure" is: "The openings should not exceed 1/2 sq. in. in area and should be of such shape as not to permit the passage of a rod larger than 1/2 in. in diameter, except where the distance of exposed live parts from the guard is more than 4 in. the openings may be 3/4 sq. in. in area and must be of such shape as not to permit the passage of a rod larger than 3/4 in. in diameter." (IA) 45-1983r