

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 In some cases, terms from withdrawn standards are included when no current source can be found.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

The sponsoring body for this document was Standards Coordinating Committee 10 on Definitions (SCC10), which consisted of the following members:

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rates one or more pairs of urethane or neoprene-lined, power-driven, single or multiple groove bullwheels in which each pair is arranged in tandem. Pulling is accomplished by friction generated against the pulling line that is reeved around the grooves of a pair of the bullwheels. The puller is usually equipped with its own engine, which drives the bullwheels mechanically, hydraulically, or through a combination of both. Some of these devices function as either a puller or tensioner. *Synonym:* puller. (PE/T&D) 524-1992

puller, drum A device designed to pull a conductor during stringing operations. It is normally equipped with its own engine, which drives the drum mechanically, hydraulically, or through a combination of both. It may be equipped with synthetic fiber rope or wire rope to be used as the pulling line. The pulling line is payed out from the unit, pulled through the travelers in the sag section, and attached to the conductor. The conductor is then pulled in by winding the pulling line back onto the drum. This unit is sometimes used with synthetic fiber rope acting as a pilot line to pull heavier pulling lines across canyons, rivers, etc. *Synonyms:* hoist; hoist, single drum; tugger; winch, single drum. (PE/T&D) 524-1992

puller, reel A device designed to pull a conductor during stringing operations. It is normally equipped with its own engine, which drives the supporting shaft for the reel mechanically, hydraulically, or through a combination of both. The shaft, in turn, drives the reel. The application of this unit is essentially the same as that for the drum puller. Some of these devices function as either a puller or tensioner. *See also:* puller, drum. (PE/T&D) 524-1992

puller, two drum, three drum The definition and application for this unit is essentially the same as that for the drum puller. It differs in that this unit is equipped with two or three drums and thus can pull one, two, or three conductors individually or simultaneously. *Synonyms:* hoist, double drum; hoist, triple drum; tugger; winch, double drum; winch, three drum; winch, triple drum; winch, two drum. *See also:* puller, drum. (PE/T&D) 524-1992

pulley (1) (rotating machinery) (sheave) A shaft-mounted wheel used to transmit power by means of a belt, chain, band, etc. *See also:* rotor. (PE) [9]

(2) *See also:* sheave. (PE/T&D) 524-1992

pull function* *See:* dragging.

* Deprecated.

pulling eye A device that may be fastened to the conductor or conductors of a cable or formed by or fastened to the wire armor and to which a hook or rope may be directly attached in order to pull the cable into or from a duct. *Note:* Pulling eyes are sometimes equipped, like test caps, with facilities for oil feed or vacuum treatment. (PE/T&D) [10]

pulling figure (oscillators) The difference between the maximum and minimum values of the oscillator frequency when the phase angle of the load-impedance reflection coefficient varies through 360 degrees, while the absolute value of this coefficient is constant and equal to a specified value, usually 0.20. (Voltage standing-wave ratio 1.5.) *See also:* oscillatory circuit; waveguide. (ED) 161-1971w

pulling into synchronism (rotating machinery) The process of synchronizing by changing from asynchronous speed to synchronous. (PE) [9]

pulling iron An anchor secured in the wall, ceiling, or floor of a manhole or vault to attach rigging used to pull cable. (NESC) C2-1997

pulling line (conductor stringing equipment) A high strength line, normally synthetic fiber rope or wire rope, used to pull the conductor. However, on reconstruction jobs where a conductor is being replaced, the old conductor often serves as the pulling line for the new conductor. In such cases, the old conductor must be closely examined for any damage prior to the pulling operation. *Synonyms:* bull line; hard line. (PE/T&D) 524-1980s, 524a-1993

pulling out of synchronism (rotating machines) The process of losing synchronism by changing from synchronous speed

to a lower asynchronous speed (for a motor) or higher asynchronous speed (for a generator). (PE) [9]

pulling rope *See:* line, pulling.

pulling tension The longitudinal force exerted on a cable during installation. (NESC) C2-1997

pulling vehicle (conductor stringing equipment) Any piece of mobile ground equipment capable of pulling pilot lines, pulling lines, or conductors. However, helicopters may be considered as a pulling vehicle when utilized for the same purpose. (PE/T&D) 524-1992, 524a-1993

pull-in test (synchronous machines) A test taken on a machine that is pulling into synchronism from a specified slip. (PE) [9]

pull-in time (acquisition time) (communication satellite) The time required for achieving synchronization in a phase-lock loop. (COM) [25]

pull-in torque (synchronous motor) The maximum constant torque under which the motor will pull its connected inertia load into synchronism, at rated voltage and frequency, when its field excitation is applied. *Note:* The speed to which a motor will bring its load depends on the power required to drive it and whether the motor can pull the load into step from this speed depends on the inertia of the revolving parts, so that the pull-in torque cannot be determined without having the Wk^2 as well as the torque of the load. (PE) [9]

pull or transfer box A box without a distribution panel, within which one or more corresponding electric circuits are connected or branched. (PE/T&D) [10]

pull-out test (rotating machinery) A test to determine the conditions under which an alternating-current machine develops maximum torque while running at specified voltage and frequency. *See also:* asynchronous machine. (PE) [9]

pull-out torque (electric installations on shipboard) (synchronous machines) The maximum sustained torque which the machine or a synchronous motor will develop at synchronous speed with rated voltage applied at rated frequency and with normal excitation. (IA/PE) [9], 45-1983r

pull rope A rope, attached to the cable, that is used to pull the cable through the conduit system. *Synonym:* bull rope. (PE) 1185-1994

pull setting *See:* sag section.

pull site (conductor stringing equipment) The location on the line where the puller, reel winder, and anchors (snubs) are located. This site may also serve as the pull or tension site (anchor) for the next sag section. *Synonyms:* reel setup; tugger setup. (PE/T&D) 524-1980s, 524a-1993

pull-up torque (alternating-current motor) The minimum torque developed by the motor during the period of acceleration from rest to the speed at which breakdown torque occurs with rated voltage applied at rated frequency. (PE) [9]

pulsating function A periodic function whose average value over a period is not zero. For example, $f(t) = A + B \sin \omega t$ is a pulsating function where neither A nor B is zero. (Std100) 270-1966w

pulse (1) (data transmission) (impulse) A brief excursion of a quantity from normal. (PE) 599-1985w

(2) **(automatic control)** A variation of a signal whose value is normally constant; this variation is characterized by a rise and a decay, and has a finite duration. (PE) [3]

(3) **(pulse terminology)** A wave that departs from a first nominal state, attains a second nominal state, and ultimately returns to the first nominal state. Throughout the remainder of this document the term pulse is included in the term wave. (IM) 194-1977w

(4) A wave that departs from an initial level for a limited duration of time and ultimately returns to the original level. *Note:* In demand metering, the term "pulse" is also applied to a sudden change of voltage or current produced, for example, by the closing or opening of a contact. (ELM) C12.1-1988

(5) A variation in the value of a magnitude which is short in relation to the time schedule of interest, the final value being the same as the initial value. *Note:* In digital logic circuits, a pulse is usually a voltage. *See also:* recovery time; strobe.

(C) 610.10-1994, 610.7-1995

(6) **(relaying)** A brief excursion of a quantity from its initial level.

(PE/SWG) C37.100-1992

pulse accumulator (or register) (of a telemeter system) A device that accepts and stores pulses and makes them available for readout on demand.

(PE/SWG) C37.100-1992

pulse advance (pulse terminology) (delay) The occurrence in time of one pulse waveform before (after) another pulse waveform.

(IM) 194-1977w

pulse advance interval (pulse terminology) (delay interval) The interval by which, unless otherwise specified, the pulse start time of one pulse waveform preceded (follows), unless otherwise specified, the pulse start time of another pulse waveform.

(IM) 194-1977w

pulse amplifier (pulse techniques) An amplifier designed specifically for the amplification of electric pulses. *See also:* pulse.

(NPS) 175-1960w

pulse amplifier or relay A device used to change the amplitude or waveform of a pulse for retransmission to another pulse device.

(ELM) C12.1-1988

pulse amplitude, A_M (1) (pulse transformers) That quantity determined by the intersection of a line passing through the points on the leading edge where the instantaneous value reaches 10% and 90% of A_M and a straight line that is the best least-squares fit to the pulse in the pulse-top region (usually this is fitted visually rather than numerically). For pulses deviating greatly from the ideal trapezoidal pulse shape, a number of successive approximations may be necessary to determine A_M . *Note:* The pulse amplitude A_M may be arrived at by applying the following procedure.

- 1) Visually or numerically determine the best straight line fit to the pulse in the pulse-top region and extend this straight line into the leading-edge region.
- 2) An initial estimate of A_M is the first intersection of the pulse (in the late leading-edge or early pulse-top regions) with the straight line fitted to the pulse top.
- 3) Using the estimate of A_M calculate $0.1 A_M$ and $0.9 A_M$ and draw a straight line through these two points of the pulse-leading edge.
- 4) The intersection of the leading-edge straight line and the pulse-top straight line gives an improved estimate of A_M .
- 5) Repeat steps 3 and 4 until the estimate of A_M does not change. The converged estimate is the pulse amplitude A_M .

(PEL) 390-1987r

(2) The algebraic difference between the top magnitude and the base magnitude.

(IM) 194-1977w

(3) A general term indicating the magnitude of a pulse measured with respect to the normally constant value unless otherwise stated.

(ED) [127]

pulse amplitude modulation (PAM) (1) (data transmission) (pulse terminology) Modulation in which the modulating wave is caused to amplitude modulate a pulse carrier.

(AP/IM) 145-1983s, 194-1977w

(2) A form of pulse modulation in which the amplitude of a pulse carrier is varied.

(C) 610.7-1995

pulse amplitude, peak *See:* peak pulse amplitude.

pulse amplitude, root-mean-square *See:* root-mean-square (effective) pulse amplitude.

pulse average time (light-emitting diodes) The time interval between the instants at which the instantaneous pulse amplitude first and last reaches a specified fraction of the peak pulse amplitude, namely, 50%.

(ED) [127]

pulse bandwidth (pulse terminology) The smallest continuous frequency interval outside of which the amplitude (of the spectrum) does not exceed a prescribed fraction of the amplitude at a specified frequency. Caution: This definition permits the spectrum amplitude to be less than the prescribed

amplitude within the interval. *Notes:* 1. Unless otherwise stated, the specified frequency is that at which the spectrum has its maximum amplitude. 2. This term should really be pulse spectrum bandwidth because it is the spectrum and not the pulse itself that has a bandwidth. However, usage has caused the contraction and for that reason the term has been accepted. *See also:* signal.

(IM) 194-1977w

pulse base (pulse techniques) (pulse waveform) That major segment having the lesser displacement in amplitude from the baseline, excluding major transitions. *See also:* pulse.

(IM) [40]

pulse, bidirectional *See:* bidirectional pulses.

pulse broadening (fiber optics) An increase in pulse duration. *Note:* Pulse broadening may be specified by the impulse response, the root-mean-square pulse broadening, or the full-duration-half-maximum pulse broadening. *See also:* full width (duration) half maximum; impulse response; root-mean-square pulse broadening.

(Std100) 812-1984w

pulse burst (1) (pulse terminology) A finite sequence of pulse waveforms.

(IM) 194-1977w

(2) A sequence of pulses, usually generated coherently and batch-processed for Doppler resolution, and often having a total duration less than the radar echo delay time.

(AE) 686-1990w

pulse burst base envelope (pulse terminology) Unless otherwise specified, the waveform defined by a cubic natural spline with knots at (A) that point of intersection of the pulse burst top envelope and the pulse burst waveform which precedes the first pulse waveform in a pulse burst, (B) each point of intersection of the base center line and the baseline between adjacent pulse waveforms in a pulse burst, and (C) that point of intersection of the pulse burst top envelope and the pulse burst waveform which follows the last pulse waveform in a pulse burst. *See also:* knot.

(IM) 194-1977w

pulse burst time-related definitions (A) (pulse terminology) (pulse burst duration) The interval between the pulse start time of the first pulse waveform and the pulse stop time of the last pulse waveform in a pulse burst. **(B) (pulse terminology) (pulse burst separation)** The interval between the pulse stop time of the last pulse waveform in a pulse burst and the pulse start time of the first pulse waveform of the immediately following pulse burst. **(C) (pulse terminology) (pulse burst repetition period)** The interval between the pulse start time of the first pulse waveform in a pulse burst and the pulse start time of the first pulse waveform in the immediately following pulse burst in a sequence of periodic pulse bursts. **(D) (pulse terminology) (pulse burst reception frequency)** The reciprocal of burst repetition period.

(IM) 194-1977w

pulse burst top envelope (pulse terminology) Unless otherwise specified, the waveform defined by a cubic natural spline with knots at: the first transition mesial point of the first pulse waveform in a pulse burst; each point of intersection of the top centerline and the topline of each pulse waveform in a pulse burst; and the last transition mesial point of the last pulse waveform in a pulse burst. *See also:* knot.

(IM) 194-1977w

pulse capacity (metering) The number of pulses per demand interval that a pulse receiver can accept and register without loss.

(ELM) C12.1-1988

pulse capture (accelerometer) (gyros) A technique that uses discrete quanta of torque-time (force-time) area to generate a restoring torque (force).

(AE) 528-1994

pulse carrier (1) A carrier consisting of a series of pulses. *Note:* Usually, pulse carriers are employed as subcarriers. *See also:* carrier.

(AP/IM) 145-1983s, 194-1977w

(2) A series of identical pulses intended for modulation.

(C) 610.7-1995

pulse, carrier-frequency *See:* carrier-frequency pulse.

pulse code (A) A pulse train modulated so as to represent information. **(B)** Loosely, a code consisting of pulses, such as

Morse code, Baudot code, binary code. *See also:* pulse.

(IM) [40], 194-1977w

pulse code modulation (1) (data transmission) The type of pulse modulation where the magnitude of the signal is sampled and each sample is approximated to a nearest reference level (this process is called quantizing). Then a code, which represents the reference level, is transmitted to the distant location. The figure above is an example of one form of PCM which has eight reference levels. It can be seen that a straight binary code would require a group of three pulses to be transmitted for each sample. The main advantage of PCM is the fact that at the receiving end only the presence or absence of a pulse must be detected. (Std100) [123]

(2) (pulse terminology) A modulation process involving the conversion of a waveform from analog to digital form by means of coding. *Notes:* 1. This is a generic term, and additional specification is required for a specific purpose. 2. The term is commonly used to signify that form of pulse modulation in which a code is used to represent quantized values of instantaneous samples of the signal wave.

(IM) 194-1977w, 270-1964w

(3) A modulation technique in which an analog signal is converted to a bit stream for transmission. (C) 610.7-1995

pulse coder (navigation aid terms) A device for varying one or more of the characteristics of a pulse or of a pulse train so as to transmit information. (AE) 172-1983w, 686-1990w

pulse coincidence (noncoincidence) (pulse terminology) The occurrence (lack of occurrence) of two or more pulse waveforms in different waveforms either essentially simultaneously or for a specified interval. (IM) 194-1977w

pulse coincidence (noncoincidence) duration (pulse terminology) The interval between specified points on two or more pulse waveforms in different waveforms during which pulse coincidence (noncoincidence) exists. (IM) 194-1977w

pulse compression The processing of a wideband, coded signal pulse, of initially long time duration and low-range resolution, to result in an output pulse of time duration corresponding to the reciprocal of the bandwidth and, hence, higher range resolution, and with approximately the same pulse energy.

(AE) 686-1990w

pulse control (rotating electric machinery) Means by which the voltage applied to a machine circuit departs from being essentially constant if unidirectional, or from being essentially sinusoidal if alternating. Pulse-control devices include, but are not limited to, choppers, inverters, and rectifiers.

(PE) 11-1980r

pulse corner (pulse waveform feature) A continuous pulse waveform feature of specified extent which includes a region of maximum curvature or a point of discontinuity in the waveform slope.

(PE) [6]

pulse corrector (telephone switching systems) Equipment to reestablish, within predetermined limits, the make/break ratio of dial pulses.

(COM) 312-1977w

pulse count (control of system electromagnetic compatibility) The number of pulses in some specified time interval.

C63.12-1984

pulse-count deviation (metering) The difference between the number of recorded pulses and the number of pulses supplied to the input of terminals of a pulse recorder (true count), expressed as a percentage of the true count. Pulse-count deviation is applicable to each data channel of a pulse recorder.

(ELM) C12.1-1988

pulse counter (pulse techniques) A device that indicates or records the total number of pulses that it has received during a time interval. *See also:* pulse.

(NPS) 398-1972r

pulsed-Doppler radar A Doppler radar that uses pulsed transmissions.

(AE) 686-1990w

pulse decay time (1) (germanium gamma-ray detectors) (x-ray energy spectrometers) The interval between the instants at which the instantaneous value last reaches specified upper and lower limits, namely, 90% and 10% of the peak pulse value unless otherwise stated. (In the case of a step function applied to an amplifier that has simple capacitance-resistance to resistance-capacitance (CR-RC) shaping, the decay time is given by $t_d = 3.36CR$.)

(NPS) 301-1976s, 325-1986s, 759-1984r

(2) (light-emitting diodes) (pulse fall time) The interval between the instants at which the instantaneous amplitude last reaches specified upper and lower limits, namely, 90% and 10% of the peak pulse amplitude unless otherwise stated. *See also:* pulse.

(BT/ED/NPS) [127], [34], 300-1982s, 301-1976s, 325-1971w

(3) (data transmission) The interval of time required for the trailing edge of a pulse to decay from 90% to 10% of the peak-pulse amplitude.

(PE) 599-1985w

(4) (laser maser) The time duration of a laser pulse; usually measured as the time interval between the half-power points on the leading and trailing edges of the pulse.

(LEO) 586-1980w

(5) (radar) *See also:* pulse width.

(AE) 686-1982s

pulse decoder (navigation aid terms) A device for extracting information from a pulse-coded signal. *Synonym:* constant-delay discriminator.

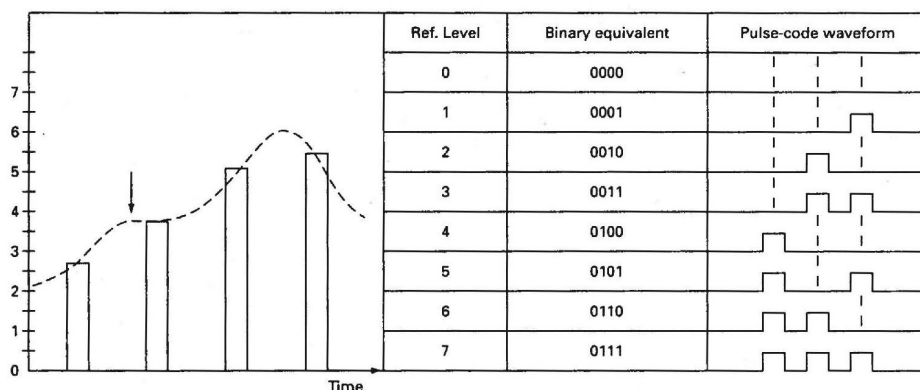
(AE) 172-1983w, 686-1990w

pulse delay time (light-emitting diodes) The interval between the instants at which the instantaneous amplitudes of the input pulse and output pulses first reach a specified fraction of their peak pulse amplitudes, namely, 10%.

(ED) [127]

pulse delay, transducer *See:* delay, pulse.

pulse delay, transmitter *See:* delay, pulse.



A form of pulse code modulation
pulse code modulation

pulse density violation A violation that occurs if a signal contains more than a specified number of zeros, or the density of ones is less than specified. (COM) 1007-1991

pulse device (for electricity metering) The functional unit for initiating, transmitting, retransmitting, or receiving electric pulses, representing finite quantities, such as energy, normally transmitted from some form of electricity meter to a receiver unit. (ELM) C12.1-1988

pulse distortion See: distortion.

pulsed laser (laser maser) A laser that delivers its energy in the form of a single pulse or train of pulses. The duration of a pulse ≤ 0.25 s. (LEO) 586-1980w

pulse Doppler radar (navigation aid terms) A Doppler radar that uses pulsed transmission. (AE) 172-1983w

pulsed optical feedback preamplifier (germanium gamma-ray detectors) A charge-sensitive preamplifier in which the charge that accumulates on the feedback capacitor is periodically reset by a pulse of light incident on a suitable photosensitive element [for example, the gate of the n-p junction of the input FET (field effect transistor)]. (NPS) 325-1986s

pulsed oscillator An oscillator that is made to operate during recurrent intervals by self-generated or externally applied pulses. See also: oscillatory circuit. (AP) 145-1983s

pulsed-oscillator starting time The interval between the leading-edge pulse time of the pulse at the oscillator control terminals and the leading-edge pulse time of the related output pulse. (IM) 194-1977w

pulse droop (television) A distortion of an otherwise essentially flat-topped rectangular pulse characterized by a decline of the pulse top. See also: television. (IM) 194-1977w

pulse duration (1) (fiber optics) The time between a specified reference point on the first transition of a pulse waveform and a similarly specified point on the last transition. The time between the 10%, 50%, or 1/e points is commonly used, as is the root-mean-square (rms) pulse duration. See also: root-mean-square pulse duration. (Std100) 812-1984w

(2) (loosely) The duration of a rectangular pulse whose energy and peak power equal those of the pulse in question. Note: When determining the peak power, any transients of relatively short duration are frequently ignored. See also: phase modulation; pulse. (AP/PE) 145-1983s, 599-1985w

(3) (radiation counters) (telecommunications) (television) The time interval between the first and last instants at which the instantaneous amplitude reaches a stated fraction of the peak pulse amplitude. See also: pulse; signal. (BT/NPS/PE) [34], 398-1972r, 599-1985w

(4) (laser maser) The time duration of a laser pulse; usually measured as the time interval between the half-power points on the leading and trailing edges of the pulse. (LEO) 586-1980w

(5) (pulse terminology) The duration between pulse start time and pulse stop time. See also: waveform epoch. (IM) 194-1977w

(6) (charged-particle detectors) (of an amplifier output pulse) The width of a pulse measured between the first and last transitions at designated levels. (NPS) 300-1988r

(7) (pulse transformers) (90%) (t_p) The time interval between the instants at which the instantaneous value reaches 90% of A_M on the leading edge and 90% of A_T on the trailing edge. Notes: 1. Often the input pulse tilt (droop) is only a few percentages, and in those cases pulse duration may be considered as the time interval between the first and last instants at which the instantaneous value reaches 90% of A_M . 2. Pulse duration may be specified at a value other than 90% A_M and A_T in special cases. (PEL) 390-1987r

(8) (at the baseline) The width of a pulse measured close to the baseline, typically at 1% of the peak height (t_{01}). (NPS) 325-1996

pulse-duration discriminator A circuit in which the output is a function of the deviation of the input pulse duration from a reference. (AE) 686-1990w

pulse-duration distribution (electromagnetic site survey) The fraction of pulse duration at level v that exceeds time T . See also: average crossing rate. (EMC) 473-1985r

pulse-duration modulation (1) (pulse terminology) Pulse-time modulation in which the value of each instantaneous sample of the modulating wave is caused to modulate the duration of a pulse. Notes: 1. The deprecated terms pulse-width modulation and pulse-length modulation also have been used to designate this system of modulation. 2. In pulse-duration modulation, the modulating wave may vary the time of occurrence of the leading edge, the trailing edge, or both edges of the pulse. (AP/IM) 145-1983s, 194-1977w

(2) See also: pulse-width modulation. (Std100)

pulse-duration-modulation torquing (accelerometer) (gyros) A torquing mechanization that provides current to a sensor torquer of fixed amplitude but variable pulse duration proportional to input. The duration may be quantized to enable digital interpretation and readout. (AE) 528-1994

pulse-duration telemetering (electric power system) (pulse-width modulation) A type of telemetering in which the duration of each transmitted pulse is varied as a function of the magnitude of the measured quantity. See also: telemetering. (PE) 94-1970w

pulse duration time (t_p) (light-emitting diodes) The time interval between the first and last instants at which the instantaneous amplitude reaches a stated fraction of the peak pulse amplitude, namely, 90%. (ED) [127]

pulse duty factor (light-emitting diodes) The ratio of the average pulse duration to the average pulse spacing. Note: This is equivalent to the product of the average pulse duration and the pulse-repetition rate. (IM) 194-1977w

pulse energy (pulse terminology) The energy transferred or transformed by a pulse(s). Unless otherwise specified by a mathematical adjective, the total energy over a specified interval is assumed. See also: mathematical adjectives. (IM) 194-1977w

pulse expander/pulse compressor An expander device spreads the input energy from a relatively narrow pulse over a relatively large interval of time. The compressor acts as a matched conjugate filter that recompresses the energy spread by the expander into a relatively small interval of time (mainlobe) accompanied by a certain level of time sidelobes. (UFCF) 1037-1992

pulse fall time (1) (photomultipliers for scintillation counting) The interval between the instants at which the instantaneous amplitude last reaches specified upper and lower limits, namely, 90% and 10% of the peak pulse amplitude unless otherwise stated. (NPS) 398-1972r

(2) (charged-particle detectors) The interval between the instants at which the instantaneous value last reaches specified upper and lower limits, namely, 90% and 10% of the peak pulse value unless otherwise stated. (In the case of a step function applied to an amplifier that has simple capacitance-resistance to resistance-capacitance (CR-RC) shaping, the fall time is given by $t_f = 3.36$ CR.) (NPS) 300-1982s

pulse-forming line A passive electric network in a radar modulator whose propagation delay determines the length of the modulation pulse. (AE) 686-1990w

pulse frequency modulation (data transmission) (pulse terminology) A form of pulse-time modulation in which the pulse-repetition rate is the characteristic varied. Note: A more precise term for pulse-frequency modulation would be "pulse-repetition-rate modulation." (IM/PE) 194-1977w, 599-1985w

pulse frequency modulation telemetry (communication satellite) A telemetry system where the information is coded according to subcarrier frequency, pulse duration and pulse repetition rate. Often used for satellite telemetry. (COM) [24]

pulse, Gaussian A pulse shape tending to follow the Gaussian curve corresponding to $A(t) = e - a(b - t)^2$. See also: pulse. (IM) [40]

pulse-height analyzer (1) (radiation counters) An instrument capable of indicating the number or rate of occurrence of pulses falling within each of one or more specified amplitude ranges. *See also:* pulse. (NPS) 398-1972r

(2) (radiation counters) A circuit that produces an output signal if it receives an input pulse whose amplitude falls between upper and lower assigned values. (NI) N42.15-1990

pulse-height analyzer, multichannel A circuit that accepts all input pulses and assigns each pulse to a memory location corresponding to its amplitude. (NI) N42.15-1990

pulse-height discriminator (liquid-scintillation counting) A circuit that produces an output signal if it receives an input pulse whose amplitude exceeds an assigned value. (NI) N42.15-1980s

pulse height radiation *See:* resolution, pulse height.

pulse-height resolution constant, electron (photomultipliers) The product of the square of the electron (photomultiplier) pulse-height resolution expressed as the fractional full width at half maximum (FWHM/A_1), and the mean number of electrons per pulse from the photocathode. *See also:* phototube. (NPS) 175-1960w

pulse-height resolution, electron (photomultipliers) A measure of the smallest change in the number of electrons in a pulse from the photocathode that can be discerned as a change in height of the output pulse. Quantitatively, it is the fractional standard deviation (σ/A_1) of the pulse-height distribution curve for output pulses resulting from a specified number of electrons per pulse from the photocathode. *Note:* The fractional full width at half maximum of the pulse-height distribution curve (FWHM/A_1) is frequently used as a measure of this resolution, where A_1 is the pulse height corresponding to the maximum of the distribution curve. *See also:* pulse. (NPS) 398-1972r

pulse-height selector (pulse techniques) A circuit that produces a specified output pulse when and only when it receives an input pulse whose amplitude lies between two assigned values. *See also:* pulse. (NPS) 175-1960w

pulse initiator (metering) Any device, mechanical or electrical, used with a meter to initiate pulses, the number of which are proportional to the quantity being measured. It may include an external amplifier or auxiliary relay or both. (ELM) C12.1-1988

pulse-initiator coupling ratio (metering) The number of revolutions of the pulse-initiating shaft for each output pulse. (ELM) C12.1-1988

pulse-initiator gear ratio (metering) The ratio of meter rotor revolutions to revolutions of the pulse-initiating shaft. (ELM) C12.1-1988

pulse-initiator output constant (metering) The value of the measured quantity for each outgoing pulse of a pulse initiator, expressed in kilowatt hours per pulse, kilovarhours per pulse, or other suitable units. (ELM) C12.1-1988

pulse-initiator output ratio (metering) The number of revolutions of the meter rotor per output pulse of the pulse initiator. (ELM) C12.1-1988

pulse-initiator ratio (metering) The ratio of revolutions of the first gear of the pulse initiator to revolutions of the pulse-initiating shaft. (ELM) C12.1-1988

pulse-initiator shaft reduction (metering) The ratio of revolutions of the meter rotor to the revolutions of the first gear of the pulse initiator. (ELM) C12.1-1988

pulse interleaving A process in which pulses from two or more sources are combined in time-division multiplex for transmission over a common path. (IM) 194-1977w

pulse interrogation The triggering of a transponder by a pulse or pulse mode. *Note:* Interrogations by means of pulse modes may be employed to trigger a particular transponder or group of transponders. (IM) 194-1977w

pulse interval *See:* pulse spacing.

pulse-interval modulation A form of pulse-time modulation in which the pulse spacing is varied. (IM) 194-1977w

pulse jitter A relatively small variation of the pulse spacing in a pulse train. *Note:* The jitter may be random or systematic, depending on its origin, and is generally not coherent with any pulse modulation imposed. (IM) 194-1977w

pulse length (fiber optics) Often erroneously used as a synonym for pulse duration. (Std100) 812-1984w

pulse-length modulation *See:* pulse-duration modulation.

pulse measurement The assignment of a number and a unit of measurement to a characteristic, property, or attribute of a pulse wherein the number and unit assigned indicate the magnitude of the characteristic which is associated with the pulse. Typically, this assignment is accomplished by comparison of a transform of the pulse, its pulse waveform, with a scale or reference which is calibrated in the unit of measurement. *See also:* method of pulse measurement. (IM) 181-1977w

pulse measurement process A realization of a method of pulse measurement in terms of specific devices, apparatus, instruments, auxiliary equipment, conditions, operators, and observers. *See also:* method of pulse measurement. (IM) 181-1977w

pulse mode (A) A finite sequence of pulses in a prearranged pattern used for selecting and isolating a communication channel. **(B)** The prearranged pattern. (IM) 194-1977w

pulse mode, spurious *See:* spurious pulse mode.

pulse modulation (1) (continuous-wave) Modulation of one or more characteristics of a pulse carrier. *Note:* In this sense, the term is used to describe methods of transmitting information on a pulse carrier. (IT) [7]

(2) The encoding of information by varying the basic characteristics of a sequence of pulses, such as width, duration, amplitude, phase or the number of pulses. *See also:* pulse amplitude modulation; pulse code modulation; pulse position modulation. (C) 610.10-1994, 610.7-1995

pulse modulation, width *See:* pulse-duration modulation.

pulse modulator A device that applies pulses to the element in which modulation takes place. *See also:* modulation. (AP) 145-1983s

pulse number (1) (circuit properties) (self-commutated converters) (of a group of principal branches or of a complete converter) The number of nonsimultaneous commutations from one principal branch to another during one cycle of operation, considering the group or the complete converter, respectively. (IA) 936-1987w

(2) The total number of successive nonsimultaneous commutations occurring within the converter circuit during each cycle when operating without phase control. It is also equal to the order of the principal harmonic in the direct voltage, that is, the number of pulses present in the dc output voltage in one cycle of the supply voltage. (IA) 519-1992

pulse operation The method of operation in which the energy is delivered in pulses. *Note:* Pulse operation is usually described in terms of the pulse shape, the pulse duration, and the pulse-recurrence frequency. *See also:* pulse. (PE) 599-1985w

pulse packet The volume of space occupied by a single radar pulse. The dimensions of this volume are determined by the angular width of the beam, the duration of the pulse, and the distance from the antenna. (AE) 686-1990w

pulse-pair resolution (photomultipliers) The time interval between two equal-amplitude delta-function optical pulses such that the valley between the two corresponding anode pulses falls to fifty percent of the peak amplitude. (NPS) 398-1972r

pulse period (1) (measuring the performance of tone address signaling systems) When sending a sequence of signals, the time interval from the start of one signal present condition to the start of the next signal present condition. *Synonym:* cycle time. (COM) 752-1986r

(2) (dial-pulse address signaling systems) (telephony) The time from the start of one break interval of a dial pulse in a train until the start of the next break interval. Milliseconds is

the preferred unit of time to express the duration of the pulse period. (COM) 753-1983w

pulse permeability (magnetic core testing) The value of amplitude permeability when the rate of change of induction (that is, the exciting voltage) is held substantially constant over a period of time during each cycle. The frequency, amplitude, duration of the exciting voltage, and the time interval for which the permeability is measured must be stated

$$\mu_r = \frac{1}{\mu_0} \frac{\Delta B}{\Delta H}$$

where

μ_r = pulse permeability, relative

ΔB = change in induction during the stated time interval

ΔH = associated change in magnetic field strength.

Note: When pulse permeability is to be related to a specific circuit condition, a second subscript may be used; for example, μ_{ra} would represent the relative amplitude permeability determined under pulsed excitation.

(MAG) 393-1977s

pulse pileup Occurrence of two successive pulses closely associated in time but from separate decays such that they contribute to each other's pulse height and shape. Usually, the system processes the two inputs as a composite single pulse, which is stored in a spectral channel different from that at which either of the component pulses would have been stored. Pulse pileup is a function of the square of the counting rate and of the amplifier pulse width. *Synonym:* random summing. (NI) N42.14-1991

pulse position modulation (PPM) (1) (data transmission) (pulse-phase modulation) Pulse-time modulation in which the value of each instantaneous sample of a modulating wave is caused to modulate the position in time of a pulse.

(AP/PE) 145-1983s, 599-1985w

(2) A form of pulse modulation in which the position in time of a pulse is varied, without modifying the pulse duration, to convey information. (C) 610.7-1995

pulse power (pulse terminology) The power transferred or transformed by a pulse(s). Unless otherwise specified by a mathematical adjective average power over a specified interval is assumed. *See also:* mathematical adjectives.

(IM) 194-1977w

pulse power, carrier-frequency peak *See:* peak pulse power, carrier-frequency.

pulse quadrant (pulse waveform feature) One of the four continuous and contiguous waveform features of specified extent that include a region of maximum curvature or a point of discontinuity in the waveform slope. (PE) [6]

pulse, radio-frequency *See:* radio-frequency pulse.

pulse rate (watt-hour meter) The number of pulses per demand interval at which a pulse device is nominally rated. *See also:* auxiliary device to an instrument; pulse-repetition frequency.

(ELM) C12.1-1982s

pulse rate—maximum The number of pulses per second at which a pulse device is nominally rated.

(ELM) C12.1-1988

pulse rate telemetering (electric power system) A type of telemetering in which the number of unidirectional pulses per unit time is varied as a function of the magnitude of the measured quantity. *See also:* telemetering. (PE) 94-1970w

pulse ratio (dial-pulse address signaling systems) (telephony) The percentage of the total dial-pulse period during which the circuit is in each of the two interval states. This ratio is customarily expressed as % break (preferred) of % make.

(COM) 753-1983w

pulse rebalance *See:* pulse capture.

pulse receiver (metering) The unit that receives and registers the pulses. It may include a periodic resetting mechanism, so that a reading proportional to demand may be obtained.

(ELM) C12.1-1988

pulse recorder (metering) A device that receives and records pulses over a given demand interval. *Note:* It may record

pulses in a machine-translatable form on magnetic tape, paper tape, or other suitable media. (ELM) C12.1-1988

pulse-recorder channel (metering) A means of conveying information. It consists of an individual input, output, and intervening circuitry required to record pulse data on the recording media. (ELM) C12.1-1988

pulse regeneration (data transmission) The process of restoring a series of pulses to their original timing, form, and relative magnitude. (PE) 599-1985w

pulse relay—totalizing A device used to receive and totalize pulses from two or more sources for proportional transmission to another totalizing relay or to a receiver.

(ELM) C12.1-1988

pulse repeater (transponder) A device used for receiving pulses from one circuit and transmitting corresponding pulses into another circuit. It may also change the frequency and waveforms of the pulses and perform other functions. *See also:* pulse; repeater. (AP) 145-1983s

pulse-repetition frequency (1) High prf = more than 1 Hz.

(LEO) 586-1980w

(2) The number of pulses per unit of time, usually per second.

(AE) 686-1990w

pulse-repetition interval The time duration between successive pulses. The reciprocal of the pulse-repetition frequency (PRF). (AE) 686-1990w

pulse-repetition period *See:* pulse-repetition interval.

pulse-repetition rate *See:* pulse-repetition frequency.

pulse reply The transmission of a pulse or pulse mode by a transponder as the result of an interrogation.

(IM) 194-1977w

pulse response characteristics (pulse response curve) The relationship between the indication of a quasi-peak voltmeter and the repetition rate of regularly repeated pulses of constant amplitude. *See also:* electromagnetic compatibility.

(EMC) [53], [70]

pulse rise time (1) (charged-particle detectors) (germanium gamma-ray detectors) (x-ray energy spectrometers) The interval between the instants at which the instantaneous value first reaches specified lower and upper limits, namely, 10% and 90% of the peak pulse value unless otherwise specified. (In the case of a step function applied to an RC (resistance-capacitance) low-pass filter, the rise time is given by $t_r = 2.2$ RC. In the case of a step function applied to an amplifier that has simple CR-RC (capacitance-resistance to resistance-capacitance) shaping, that is, one high-pass and one low-pass RC filter of equal time constants, the rise time is given by $t_r = 0.57$ RC).

(NPS) 300-1982s, 301-1976s, 325-1986s, 759-1984r

(2) **(data transmission)** The interval between the instants at which the instantaneous amplitude first reaches specified lower and upper limits, namely 10% and 90% of the peak-pulse amplitude unless otherwise stated. (PE) 599-1985w

pulse separation (pulse terminology) The interval between the trailing-edge pulse time of one pulse and the leading-edge pulse time of the succeeding pulse. *See also:* leading-edge pulse time; pulse; trailing-edge pulse time.

(IM) 194-1977w

pulses, equalizing *See:* equalizing pulses.

pulse shape (A) (pulse terminology) For descriptive purposes a pulse waveform may be imprecisely described by any of the adjectives, or combinations thereof, in descriptive adjectives, major (minor); polarity related adjectives; geometrical adjectives; and functional adjectives, exponential. **(B) (pulse terminology)** For tutorial purposes a hypothetical pulse waveform may be precisely defined by the further addition of the adjective ideal. *See also:* descriptive adjectives. **(C) (pulse terminology)** For measurement or comparison purposes a pulse waveform may be precisely defined by the further addition of the adjective reference. *See also:* descriptive adjectives. (IM) 194-1977w

pulse shaper (pulse techniques) Any transducer used for changing one or more characteristics of a pulse. *Note:* This

initions; waveform

term includes pulse regenerators. *See also*: pulse.

(IM) 194-1977w

pulse shaping Intentionally changing the shape of a pulse.

(IM) 194-1977w

pulse spacing (pulse interval) The interval between the corresponding pulse times of two consecutive pulses. *Note*: The term pulse interval is deprecated because it may be taken to mean the duration of the pulse instead of the space or interval from one pulse to the next. Neither term means the space between pulses.

(IM) 194-1977w

pulse spacing distribution (electromagnetic site survey) The fraction of pulse spacing time at level v_1 that exceeds time T . *See also*: average crossing rate.

(EMC) 473-1985r

pulse spectrum (signal-transmission system) The frequency distribution of the sinusoidal components of the pulse in relative amplitude and in relative phase. *See also*: signal.

(IM) 194-1977w

pulse speed (dial-pulse address signaling systems) (telephony) The number of dial pulses occurring per unit of time per unit of time. Pulses per second (pls/s) is the preferred unit to express pulse speed.

(COM) 753-1983w

pulse spike (automatic control) An unwanted pulse of relatively short duration, superimposed on the main pulse. *See also*: spike.

(PE) [3]

pulse start time (pulse terminology) The instant specified by a magnitude referenced point on the first transition of a pulse waveform. Unless otherwise specified, the pulse start time is at the mesial point on the first transition. *See also*: pulse stop time; waveform epoch.

(IM) 194-1977w

pulse stop time (pulse terminology) The instant specified by a magnitude referenced point on the last transition of a pulse waveform. Unless otherwise specified, the pulse stop time is at the mesial point on the last transition. *See also*: pulse start time; waveform epoch.

(IM) 194-1977w

pulse storage time (light-emitting diodes) The interval between the instants at which the instantaneous amplitudes of the input and output pulses last reach a specified fraction of their peak pulse amplitudes, namely, 90 percent.

(ED) [127]

pulse stretcher (spectrum analyzer) A pulse shaper that produces an output whose duration is greater than that of the input pulse and whose amplitude is proportional to that of the peak amplitude of that input pulse.

(IM/NPS) 398-1972r, 748-1979w

pulse string *See*: pulse train.

pulse stuffing A method in which pulses are inserted into a stream of pulses to achieve synchronization between two digital communications systems.

(C) 610.7-1995

pulse techniques *See*: burst.

pulse tilt A distortion in an otherwise essentially flat-topped rectangular pulse characterized by either a decline or a rise of the pulse top. *See also*: television.

(BT/IM) [34], 194-1977w

pulse time, leading edge *See*: leading-edge pulse time.

pulse time, mean *See*: mean pulse time.

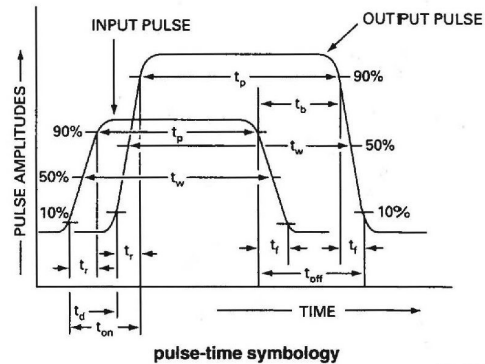
pulse-time modulation (PTM) (data transmission) (pulse terminology) Modulation in which the value of instantaneous samples of the modulating wave are caused to modulate the time of occurrence of some characteristic of a pulse carrier. *Note*: Pulse-duration modulation, pulse-position modulation, and pulse-interval modulation, are particular forms of pulse-time modulation.

(AP/IM/PE) 145-1983s, 194-1977w, 599-1985w

pulse-time reference points (A) (pulse terminology) (top center point). A specified time referenced point or magnitude referenced point on a pulse waveform top. If no point is specified, the top center point is the time referenced point at the intersection of a pulse waveform and the top center line. *See also*: waveform epoch. (B) (pulse terminology) [first (last) base point]. Unless otherwise specified, the first (last) datum point in a pulse epoch. *See also*: pulse train time-related definitions; waveform epoch.

(IM) 194-1977w

pulse time symbology *See* figure below.



pulse-time, trailing-edge *See*: trailing-edge pulse time.

pulse timing of video pulses (television) The determination of an occurrence of a pulse or a specified portion thereof at a particular time. *See also*: pulse width of video pulses; television; time of rise of video pulses.

(BT) 207-1950w

pulse top (1) (pulse transformers) That portion of the pulse occurring between the time of intersection of straight-line segments used to determine A_T and A_T . (PEL) 390-1987r

(2) That major segment of a pulse waveform having the greater displacement in amplitude from the baseline. *See also*: pulse.

(IM) [40]

pulse train (1) (dial-pulse address signaling systems) (telephony) In dial-pulse signaling, a series of contiguous pulses of undetermined length.

(COM) 753-1983w

(2) (pulse terminology) A continuous repetitive sequence of pulse waveforms.

(IM) 194-1977w

(3) (thyristor) A gate signal applied during the desired conducting interval, or parts thereof, made up of a train of pulses of predetermined duration, amplitude, and frequency.

(IA) 428-1981w

(4) (signal-transmission system) A sequence of pulses. *See also*: pulse; signal.

(BT/IE/IA/PE) [3], [34], [43], [60], 270-1966w

(5) A series of pulses with similar characteristics. *Synonym*: pulse string.

(C) 610.7-1995

(6) A sequence of pulses used to accomplish a function such as MTI or increased effective signal-to-noise ratio. A pulse train of duration less than the radar echo delay time is usually referred to as a pulse burst.

(AE) 686-1990w

pulse train, periodic *See*: periodic pulse train.

pulse-train spectrum (pulse-train frequency-spectrum) The frequency distribution of the sinusoidal components of the pulse train in amplitude and in phase angle.

(IM) 194-1977w

pulse train time-related definitions (A) (pulse terminology) (pulse repetition period) The interval between the pulse start time of a first pulse waveform and the pulse start time of the immediately following pulse waveform in a periodic pulse train.

(B) (pulse terminology) (pulse repetition frequency) The reciprocal of pulse repetition period. (C) (pulse terminology) (pulse separation) The interval between the pulse stop time of a first pulse waveform and the pulse start time of the immediately following pulse waveform in a pulse train.

(D) (pulse terminology) (duty factor) Unless otherwise specified, the ratio of the pulse waveform duration to the pulse repetition period of a periodic pulse train. (E) (pulse terminology) (on-off ratio) Unless otherwise specified, the ratio of the pulse waveform duration to the pulse separation of a periodic pulse train. (F) (pulse terminology) (base center line) The time reference line at the average of the pulse stop time of a first pulse waveform and the pulse start time of the immediately following pulse waveform in a pulse train.

(G) (pulse terminology) (base center point) A specified time referenced point or magnitude referenced point on a pulse

train waveform base. If no point is specified, the base center point is the time referenced point at the intersection of a pulse train waveform base and a base center line. (H) (**pulse terminology**) (pulse train epoch) The span of time in a pulse train for which waveform data are known or knowable and which extends from a first base center point to the immediately following base center point. (IM) 194-1977w

pulse-train top (base) envelope (pulse terminology) Unless otherwise specified, the waveform defined by a cubic natural spline with knots at each point of intersection of the top center line and topline (the base center line and the baseline) of each (between adjacent) pulse waveforms(s) in a pulse train. (IM) 194-1977w

pulse train, unidirectional See: unidirectional pulse train.

pulse transmitter (1) A pulse-modulated transmitter whose peak power-output capabilities are usually large with respect to average power-output rating. See also: pulse; radio transmitter. (AP) 145-1983s

(2) (**power system device function numbers**) Used to generate and transmit pulses over a telemetering or pilot-wire circuit to the remote indicating or receiving device. (PE/SUB) C37.2-1979s

pulse turn-off time (light-emitting diodes) The arithmetic sum of the pulse storage time, and the pulse decay time of the output pulse. (ED) [127]

pulse turn-on time (light-emitting diodes) The arithmetic sum of the pulse delay time, and the pulse rise time of the output pulse. (ED) [127]

pulse-type telemeter A telemeter that employs characteristics of intermittent electric signals other than their frequency, as the translating means. Note: These pulses may be utilized in any desired manner to obtain the final indications, such as periodically counting the total number of pulses; or measuring their "on" time, their "off" time, or both. (PE/SWG/SUB) C37.1-1994, C37.100-1992

pulse waveform distortion (pulse terminology) The algebraic difference in magnitude between all corresponding points in time of a pulse waveform and a reference pulse waveform. Unless otherwise specified by a mathematical adjective, peak-to-peak pulse waveform distortion is assumed. See also: mathematical adjectives; pulse waveform feature distortion. (IM) 194-1977w

pulse waveform feature distortion (pulse terminology) The algebraic difference in magnitude between all corresponding points in time of a pulse waveform and a reference pulse waveform feature. Unless otherwise specified by a mathe-

matical adjective, peak-to-peak pulse waveform feature distortion is assumed. See also: mathematical adjectives.

(IM) 194-1977w

pulse width (1) (radar) The time interval between the points on the leading and trailing edges at which the instantaneous value bears a specified relation to the maximum instantaneous value of the pulse, usually the time interval between the half-power points of the pulse. Synonym: pulse duration. (AE/COM) [49], 686-1990w

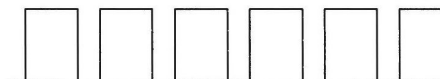
(2) (**fiber optics**) Often erroneously used as a synonym for pulse duration. (Std100) 812-1984w

pulse width at half maximum, $T_{0.5}$ (germanium gamma-ray detectors) (of an amplifier output pulse) The time interval between the 50% of maximum amplitude points of a pulse. (NPS) 325-1986s

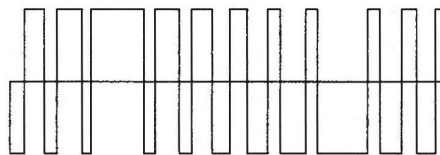
pulsewidth discriminator A device that passes only those video pulses whose duration falls within specified limits. (AE) 686-1990w

pulse-width modulation (1) (converter characteristics) (self-commutated converters) Pulse-time modulation in which the value of each instantaneous sample of the modulating wave is caused to modulate the duration of a pulse. The modulating frequency may be fixed or variable. Examples of waveforms produced by PWM are shown in the corresponding figure. See also: pulse-duration modulation.

Waveforms Produced by Pulse-Width Modulation



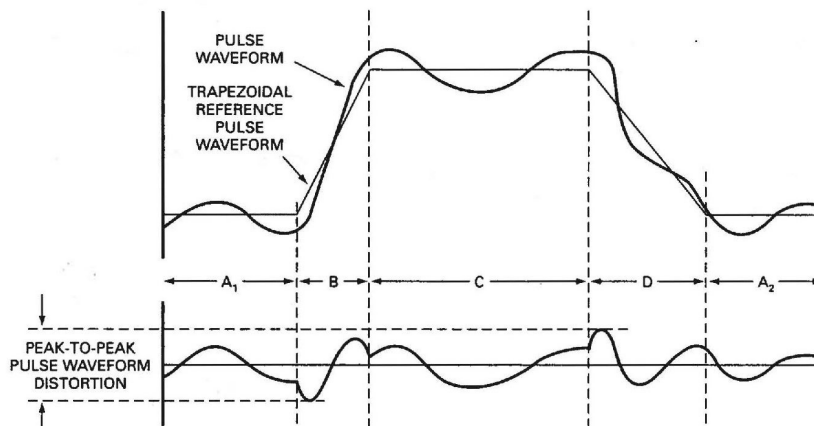
(a) DC Waveform



(b) AC Waveform

Pulse-Width Modulation

(IA) 936-1987w



EXTENT OF DATA INCLUDED IN PULSEWAVEFORM FEATURE DISTORTION:

A₁ AND A₂ - PULSE BASE DISTORTION

C - PULSE TOP DISTORTION

B - FIRST TRANSITION DISTORTION

D - LAST TRANSITION DISTORTION

Pulse waveform distortion and pulse waveform feature distortion.

pulse waveform distortion

(2) A form of pulse modulation in which the duration of the pulse carrier is varied. (C) 610.7-1995

pulse-width-modulation torquing *See*: pulse-duration-modulation torquing.

pulse width of video pulses (television) The duration of a pulse measured at a specified level. *See also*: pulse timing of video pulses. (BT) 207-1950w

pulsing (telephone switching systems) The signaling over the communication path of signals representing one or more digits required to set up a call. (COM) 312-1977w

pulsing circuit (peaking circuit) A circuit designed to provide abrupt changes in voltage or current of some characteristic pattern. *See also*: electronic controller. (IA) [60]

pulsing transformer Supplies pulses of voltage or current. *See also*: electronic controller. (IA) [60]

pump (parametric device) The source of alternating-current power that causes the nonlinear reactor to behave as a time-varying reactance. *See also*: parametric device. (ED) [46]

pump-back test (electrical back-to-back test) (rotating machinery) A test in which two identical machines are mechanically coupled together, and they are both connected electrically to a power system. The total losses of both machines are taken as the power input drawn from the system. *See also*: asynchronous machine; direct-current commutating machine. (PE) [9]

pumped figure of merit (nonlinear, active, and nonreciprocal waveguide components) (parametric amplifier) The ratio of the half-amplitude fundamental Fourier component of pumped elastance to the series resistance of the varactor diode. This quantity, designated as $m_1\omega_c$, has the dimensions of angular frequency and describes the noise, gain, and impedance characteristics of parametric amplifiers. The parameter m_1 is the normalized fundamental component of elastance and ω_c is the total angular cutoff frequency. (MTT) 457-1982w

pumped-storage hydro capability (power operations) The capability supplied by hydroelectric sources under specified water conditions using a reservoir that is alternately filled by pumping and depleted by generating. (PE) 858-1987s

pumped storage station (power operations) A hydroelectric generating station at which electrical energy is normally generated during periods of relatively high system demand by utilizing water which has been pumped into a storage reservoir usually during periods of relatively low system demand. (PE) 858-1987s

pumped tube An electron tube that is continuously connected to evacuating equipment during operation. *Note*: This term is used chiefly for pool-cathode tubes. (ED) [45]

pump efficiency (laser maser) The ratio of the power or energy absorbed from the pump to the power or energy available from the pump source. (LEO) 586-1980w

pump-free control *See*: antipump device.

pumping The unintentional cyclical tripping and closing of a network protector. (PE) C57.12.44-1994

pumping load (power operations) Totals of loads caused by pumping in pumped-storage stations within the system. (PE) 858-1987s

punch (A) A device for making holes in some data medium such as a card or paper tape. *See also*: calculating punch; card punch; card reproducing punch; spot punch. (B) A perforation created by a device as in definition (A). *See also*: digit punch; eleven punch; numeric punch; twelve punch; zone punch. (C) To make a perforation as in definition (B). *See also*: gang punch; overpunch. (C) 610.10-1994

punch card A card into which hole patterns can be punched such that the patterns can be used to store or represent information. *Note*: This term is often used in place of "punched card" a standard-sized punch card has twelve rows of 80 columns. *Synonym*: Hollerith card. *See also*: aperture card; binary card; binder-hole card; check card; control card; data

card; edge-coated card; edge-notched card; edge-punched card; header card; interpreted card; laced card; scored card; short card; trailer card; twelve-row punch card. (C) 610.10-1994

punched card (1) A card on which a pattern of holes or cuts is used to represent data. (C/MIL) [2], [20]
(2) A card punched with hole patterns such that the patterns store or represent information. *See also*: punch card. (C) 610.10-1994

punched card holder *See*: card hopper.

punched card machine *See*: card reader.

punched card reader *See*: card reader.

punched paper tape *See*: perforated tape.

punched tape (computers) A tape on which a pattern of holes or cuts is used to represent data. (C/MIL) [2], [20], [85]

punched tape handler (test, measurement, and diagnostic equipment) A device that handles punched tape and usually consists of a tape transport and punched tape reader with associated electrical and electronic equipments. Most units provide for tape to be wound and stored in reels; however, some units provide for the tape to be stored loosely in closed bins. (MIL) [2]

punched tape reader (1) (test, measurement, and diagnostic equipment) A device capable of converting information from punched tape, where it has been stored in the form of a series of holes, into a series of electrical impulses. (MIL) [2]
(2) An input unit that senses the hole patterns in a perforated tape, transforming the hole patterns into electrical signals representing data. (C) 610.10-1994

punching (rotating machinery) A lamination made from sheet material using a punch and die. *See also*: rotor; stator. (PE) [9]

punching station The place in a punch where a card or paper tape is punched. (C) 610.10-1994

punch position (computers) A site on a punched tape or card where holes are to be punched. (C/MIL) [2], [20], [85]

punch tape A tape in which hole patterns can be punched such that the patterns can be used to store or represent information. (C) 610.10-1994

punch-through voltage (x-ray energy spectrometers) (of a semiconductor radiation detector) The voltage at which a junction detector becomes fully depleted. *See also*: depletion voltage. (NPS) 759-1984r

puncture (1) (voltage testing) A disruptive discharge through the body of a solid dielectric. (PE) [55]
(2) A disruptive discharge through solid insulation. (PE) 4-1995

(3) Term used when a disruptive discharge occurs through a solid dielectric produces permanent loss of dielectric strength; in liquid or gaseous dielectric, the loss may be only temporary. (PE/PSPD) C62.11-1993

puncture voltage (surge arresters) The voltage at which the test specimen is electrically punctured. (PE/T&D) [10], [8]

pupil (1) (laser maser) The variable aperture in the iris through which light travels toward the interior of the eye. (LEO) 586-1980w

(2) (illuminating engineering) (pupillary aperture) The opening in the iris which admits light into the eye. (EEC/IE) [126]

purchaser (1) (nuclear power quality assurance) The organization responsible for establishment of procurement requirements and for issuance, administration, or both, of procurement documents. (PE) [124]
(2) (rotating electric machinery) The organization placing the contract for the machinery or its repair; often called the "user." (PE) 11-1980r

pure alphabetic Pertaining to data that contains only the letters of the alphabet (AaBbCcDdEeFfGgHh. . .). *Contrast*: pure alphanumeric; pure numeric. (C) 610.5-1990

pure alphanumeric (data management) Pertaining to data that contains only the letters of the alphabet (AaBbCcDdEeFf