I

I *See:* invalid; in-phase video.

***I*²*t* (1) (protection and coordination of industrial and commercial power systems)** The measure of heat energy developed within a circuit during the fuses melting or clearing. Generally stated as melting I^2t or clearing I^2t.

(IA/PSP) 242-1986r

(2) The integral of the square of the current during a given time interval in A^2-s:

$$I^2t = \int_{t_o}^{t_l} i^2 dt \ (A^2\text{-s})$$

Notes: 1. The melting I^2t is equal to the integral of the square of the current during the melting time of the fuse. 2. The clearing I^2t is equal to the integral of the square of the current during the clearing time of the fuse. The clearing time is equal to the sum of melting time and arcing time. 3. The I^2t (A^2-s) multiplied by the resistance (ohms) through which the current flows is equal to the energy (Joules) that will be produced in the resistance. (SWG/PE) C37.40b-1996

***I*²*t* characteristic** (of a fuse) The amount of ampere-squared seconds passed by the fuse during a specified period and under specified conditions. *Notes:* 1. The specified period may be the melting, arcing, or total clearing time. The sum of melting and arcing I^2t is the clearing I^2t. 2. The melting characteristic is related to a specified current wave shape, and the arcing I^2t to specified voltage and circuit-impedance conditions. (SWG/PE) C37.100-1992

IA *See:* laser gyro axes; internal address field; input axis.

IACK daisy-chain driver A functional module that activates the interrupt-acknowledge daisy-chain whenever an interrupt handler acknowledges an interrupt request. This daisy-chain ensures that only one interrupter responds with its status/ID when more than one has generated an interrupt request.

(C/BA) 1014-1987

IAGC *See:* instantaneous automatic gain control.

IAM Abbreviation for initial address message.

(COM/TA) 973-1990w

I_{avg} output The average output load current at which to test the unit under test, (Imin + Imax)/2. (PEL) 1515-2000

IC *See:* information center; interexchange carrier; instruction counter; integrated circuit.

ICEA The Insulated Cable Engineers Association. Founded in 1925, the ICEA is a professional society of insulated cable engineers to promote the reliability of covered and insulated conductors for the transmission and distribution of electric energy, control, and instrumentation of equipment and communications. (T&D/PE) 524a-1993r

ice detection light (illuminating engineering) An inspection light designed to illuminate the leading edge of the wing to check for ice formation. (EEC/IE) [126]

ice proof (1) (high voltage air switches, insulators, and bus supports) So constructed or protected that ice will not interfere with successful operation. (SWG/PE) C37.30-1971s

(2) So constructed or protected that ice of a specified composition and thickness will not interfere with successful operation. (SWG/PE) C37.100-1992

ICES *See:* Integrated Civil Engineering System.

ice tests Design tests made to determine the rated ice-breaking ability of the switching equipment.

(SWG/PE) C37.100-1992

I chrominance signal (national television system committee color television) The sidebands resulting from suppressed-carrier modulation of the chrominance subcarrier by the I video signal. *Note:* The signal is transmitted in vestigial form, the upper sideband being limited to a frequency within the top of the picture transmission channel (approximately 0.6 MHz above the chrominance subcarrier), and the lower sideband extending to approximately 1.5 MHz below the subcarrier. The phase of the signal, for positive I video signals, is 123 deg with respect to the (B-Y) axis.

(BT/AV) 201-1979w

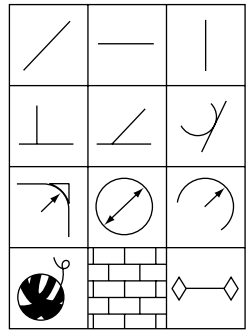
ICOM code An expression in one diagram that unambiguously identifies an arrow segment in another diagram. An ICOM code is used to associate a boundary arrow of a child diagram with an arrow attached to an ancestral box. *Synonym:* arrow reference. (C/SE) 1320.1-1998

ICOM label An arrow label attached without a squiggle directly to the arrowhead of an output boundary arrow or to the arrowtail of an input, control, or mechanism boundary arrow. An ICOM label associates a boundary arrow of a child diagram with an arrow label of an arrow attached to an ancestral box. (C/SE) 1320.1-1998

Icon A high-order programming language designed primarily to process non-numerical data, as in the applications such as analyzing natural language, transforming or generating computer programs, and formatting documents.

(C) 610.13-1993w

icon A symbol that is a pictorial indication of a command or object and is located on a graphics tablet or an on-screen menu.



icon

(C) 610.6-1991w

iconic model A physical model that looks like the system being modeled; for example, a non-functional replica of a computer tape drive used for display purposes. *See also:* scale model.

(C) 610.3-1989w

ICV *See:* integrity check value.

ICW *See:* interrupted continuous wave.

IDA *See:* independent disk array.

IDCODE (identity code) A defined instruction for the test logic defined by 1149.1-1990. (TT/C) 1149.1-1990

I_{DDQ} Current measurement taken at the ground rail during quiescent operation. (C/TT) 1450-1999

IDE *See:* integrated device electronics.

ideal capacitor (nonlinear capacitor) A capacitor whose transferred charge characteristic is single-valued. *See also:* nonlinear capacitor. (ED) [46]

ideal code bin width *Q* The full-scale range divided by the total number of code states. (IM/WM&A) 1057-1994w

ideal codec A codec that has theoretically optimum characteristics. (COM/TA) 269-1992

ideal conductor *See:* perfect conductor.

ideal dielectric *See:* perfect dielectric.

ideal filter (A) (frequency domain). A filter that passes, without attenuation, all frequencies inside specified frequency limits while rejecting all other frequencies. **(B)** (time domain). A filter with a time domain response identical to the excitation except for a constant delay. (CAS) [13]

idealized system (automatic control) An imaginary system whose ultimately controlled variable has a stipulated relationship to specified commands. *Note:* It is a basis for performance standards. *See also:* feedback control system. (IM/PE/EDPG) [120], [3]

ideally conducting medium *See:* perfect conductor.

ideal noise diode A diode that has an infinite internal impedance and in which the current exhibits full shot noise fluctuations. *See also:* signal-to-noise ratio. (ED) [45]

ideal paralleling (rotating machinery) Paralleling by adjusting the voltage, and frequency and phase angle for alternating-current machines, such that the conditions of the incoming machine are identical with those of the system with which it is being paralleled. *See also:* asynchronous machine. (PE) [9]

ideal site A test site on which the reflective surface is flat and has infinite conductivity and size. (EMC) C63.5-1988, C63.4-1988s

ideal synchronous machine A hypothetical synchronous machine that has certain idealized characteristics that facilitate analysis. *Note:* The results of the analysis of ideal machines may be applied to similar actual machines by making, when necessary, approximate corrections for the deviations of the actual machine from the ideal machine. The ideal machine has, in general, the following properties:

— the resistance of each winding is constant throughout the analysis, independent of current magnitude or its rate of change;
— the permeance of each portion of the magnetic circuit is constant throughout the analysis, regardless of the flux density;
— the armature circuits are symmetrical with respect to each other;
— the electric and magnetic circuits of the field structure are symmetrical about the direct axis or the quadrature axis;
— the self-inductance of the field, and every circuit on the field structure, is constant;
— the self-inductance of each armature circuit is a constant or a constant plus a second-harmonic sinusoidal function of the angular position of the rotor relative to the stator;
— the mutual inductance between any circuit on the field structure and any armature circuit is a fundamental sinusoidal function of the angular position of the rotor relative to the stator;
— the mutual inductance between any two armature circuits is a constant or a constant plus a second-harmonic sinusoidal function of the angular position of the rotor relative to the stator;
— the amplitude of the second-harmonic component of variation of the self-inductance of the armature circuits and of the mutual inductances between any two armature circuits is the same;
— effects of hysteresis are negligible;
— effects of eddy currents are negligible or, in the case of solid-rotor machines, may be represented by hypothetical circuits on the field structure symmetrical about the direct axis and the quadrature axis.

(PE) [9]

ideal transducer (for connecting a specified source to a specified load) A hypothetical passive transducer that transfers the maximum available power from the source to the load. *Note:* In linear transducers having only one input and one output, and for which the impedance concept applies, this is equivalent to a transducer that:

a) dissipates no energy; and
b) when connected to the specified source and load presents to each its conjugate impedance.

See also: transducer. (Std100) 270-1966w

ideal transformer A hypothetical transformer that neither stores nor dissipates energy. *Note:* An ideal transformer has the following properties: Its self and mutual impedances are equal and are pure inductances of infinitely great value; Its self-inductances have a finite ratio; Its coefficient of coupling is unity; Its leakage inductance is zero; The ratio of the primary to secondary voltage is equal to the ratio of secondary to primary current. (CHM) [51]

ideal value (1) (automatic control) (control) The value of a selected variable that would result from a perfect system operating from the same command as the actual system under consideration. *See also:* feedback control system. (CS/IA/ICTL/IAC) [60]

(2) (automatic control) The value of the ultimately controlled variable of an idealized system under consideration. *Synonym:* desired value. *See also:* ideal value. (PE/EDPG) [3]

(3) (synchronous-machine regulating system) The value of a controlled variable (for example, generator terminal voltage) that results from a desired or agreed-upon relationship between it and the commands (commands such as voltage regulator setting, limits, and reactive compensators). (PE) [9]

IDEF1X model A set of one or more IDEF1X views, often represented as view diagrams that depict the underlying semantics of the views, along with definitions of the concepts used in the views. (C/SE) 1320.2-1998

IDEF0 model Abstractly, a hierarchical set of IDEF0 diagrams that depict, for a specific purpose and from a specific viewpoint, the functions of a system or subject area, along with supporting glossary, text, and For Exposition Only (FEO) information. Concretely, a set of model pages that include at least an A-0 context diagram and an A0 decomposition diagram, a glossary or specific glossary pages, one or more text pages to accompany each diagram, and FEO pages and model pages of other types as needed. (C/SE) 1320.1-1998

identified (1) (as applied to equipment) Recognized as suitable for the specific service, purpose, function, use, environment, application, etc., where described in a particular Code requirement. (FPN) Suitability of equipment for a specific purpose, environment or application may be determined by a qualified testing laboratory, inspection agency, or other organization concerned with product evaluation. Such identification may include labeling or listing. *Note:* For more information, refer to Section 90-6 of the NEC. *See also:* equipment; listed; labeled. (NESC/NEC/DEI) 1221-1993w, [86]

(2) (data management) *See also:* functional dependency. (C) 610.5-1990w

identification (of a target) The knowledge that a particular radar return signal is from a specific target. This knowledge may be obtained by determining size, shape, timing, position, maneuvers, rate of change of any of these parameters, signal modulation characteristics, or by means of coded responses through secondary radar. *Note:* Distinguished from target classification, in which only the type of target is determined (and which is often the intended meaning), and from target recognition, a more general term that encompasses identification and classification. (AES) 686-1997

identification beacon (navigation aid terms) A beacon that transmits coded signals to identify a geographic position. (AES/GCS) 172-1983w

identifier (1) (software) The name, address, label, or distinguishing index of an object in a computer program. (C) 610.12-1990

(2) Within an IDEF0 model, a model name, a box name, or an arrow label. (C/SE) 1320.1-1998

(3) A means of designating or referring to a specific entity instance. (SCC32) 1489-1999

identifier dependency A kind of constraint between two related entities requiring the primary key in one (child entity) to contain the entire primary key of the other (parent entity). Identifying relationships and categorization structures represent identifier dependencies. (C/SE) 1320.2-1998

identifier-dependent entity *See:* dependent entity.

identifier-independent entity *See:* independent entity.

identifiers Names assigned to each of the unique parametric data elements in the data file. They cannot be the same as any Parametric Data Log (PDL) reserved words. These names can be created from any combination of characters with a few exceptions:

a) The space character (i.e., ASCII code 32) may not be used unless enclosed in double quotes.
b) They shall be unique within the file.

(SCC20) 1545-1999

identifying relationship A kind of specific (not many-to-many) relationship in which every attribute in the primary key of the parent entity is contained in the primary key of the child entity. *Contrast:* nonidentifying relationship. (C/SE) 1320.2-1998

identity (1) The Boolean operation whose result has the value 1 if and only if all the operands have the same value. *Note:* An identity operation on two operands is called an equivalence operation. *Contrast:* nonidentity. *See also:* identity gate. (C) 610.10-1994w

(2) The inherent property of an instance that distinguishes it from all other instances. Identity is intrinsic to the instance and independent of the instance's property values or the classes to which the instance belongs. (C/SE) 1320.2-1998

identity element *See:* identity gate.

identity friend or foe (IFF) Equipment used for transmitting radio signals between two stations located on ships, aircraft, or ground, for automatic identification. *Notes:* 1. The usual basic parts of equipment are interrogators, transpondors, and respondors. 2. Usually the initial letters of the name (IFF) are used instead of the full name. *See also:* radio transmission. (EEC/PE) [119]

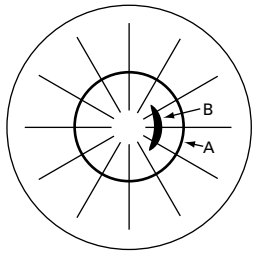
identity gate A gate that performs the Boolean operation of an identity operation. *Synonym:* identity element. (C) 610.10-1994w

identity operation A Boolean operation whose result is true if and only if the operands are all true or all false. *Note:* An identity operation on two operands is the same as an equivalence operation. (C) 1084-1986w

identity simulation A simulation in which the roles of the participants are investigated or defined; for example, a simulation that identifies aircraft based on their physical profiles, speed, altitude, and acoustic characteristics. (C) 610.3-1989w

identity-style view A view produced using the identity-style modeling constructs. (C/SE) 1320.2-1998

I-display A display used in a conical-scan radar, in which a target appears as a complete circle when the radar antenna is pointed at it and in which the radius of the circle is proportional to target range. The incorrect aiming of the antenna changes the circle to a segment whose arc length is inversely proportional to the magnitude of the pointing error, and the position of the segment indicates the direction in which the antenna should be moved to restore correct aiming.



I-display

(AES) 686-1997

IDL *See:* idle.

idle (1) A signal condition where no transition occurs on the transmission line. It is used to define the time between packets. (LM/C) 610.7-1995

(2) (software) Pertaining to a system or component that is operational and in service, but not in use. *See also:* down; busy; up. (C) 610.12-1990

(3) A signal condition where no transition occurs on the transmission line, that is used to define the end of a frame and ceases to exist after the next LO or HI transition on the Attachment Unit Interface (AUI) or Media Independent Interface (MII) circuits. An IDL always begins with a HI signal level. A driver is required to send the IDL signal for at least 2 bit times and a receiver is required to detect IDL within 1.6 bit times. (C/LM) 802.3-1998

(4) (Idle_Up, Idle_Down) A link control signal indicating that the sending entity currently has no traffic pending for the entity connected to the other end of the link.local area networks. (C) 8802-12-1998

idle bar (rotating machinery) An open circuited conductor bar in the rotor of a squirrel-cage motor, used to give low starting current in a moderate torque motor. *See also:* rotor. (PE) [9]

idle channel code A repetitive pattern (code) to identify an idle channel. In some situations this code can produce a signal on a channel. (COM/TA) 1007-1991r

idle channel noise (1) The short-term average noise level as measured according to IEEE Std 743-1984. The measurement for PTS may be made with flat or C-message weighting. The measurements are made at any analog or digital interface with the far end terminated in the appropriate code or impedance(s). (COM/TA) 973-1990w

(2) Noise present on a channel with the distant end terminated and no input signal. (COM/TA) 1007-1991r

idle character A control character that is sent when there is no information to be sent. (C) 610.5-1990w

idle circuit (telephone loop performance) The condition of a transmission channel in the talk state when no signal is present. (COM/TA) 820-1984r

Idle Interrupts Enabled IIE bit A bit in the Slave Status register of every S-module that is set to indicate that the S-module may generate an interrupt during S-idle states. (TT/C) 1149.5-1995

idle packet Four consecutive null bytes, which usually contain no information. Idle packets are used to fill the space between *RamLink* packets. They may be used to convey an interrupt request. (C/MM) 1596.4-1996

idle period (gas tube) That part of an alternating-voltage cycle during which a certain arc path is not carrying current. (ED) [45], [84]

idler circuit (nonlinear, active, and nonreciprocal waveguide components) (parametric device) A portion of a parametric device that chiefly determines the behavior of the device at an idler frequency. *See also:* parametric device. (MTT) 457-1982w

idler frequency (nonlinear, active, and nonreciprocal waveguide components) (parametric device) A sum frequency (or difference frequency) generated within the parametric device other than the input, output, or pump frequencies that requires specific circuit consideration to achieve the desired device performance. *See also:* parametric device. (MTT) 457-1982w

idle slave *See:* slave.

idle state (1) Any Link Layer Controller state the name of which begins with the uppercase letters IDLE. Such states in the MTM-Bus Master Link Layer Controller are called M-idle states and in the MTM-Bus Slave Link Layer Controller are called S-idle states. (TT/C) 1149.5-1995

(2) The inactive (nontransmitting) state of a serial link transmitter. The output of an inactive transmitter shall present a high impedance to a bidirectional serial link. (EMB/MIB) 1073.4.1-2000

idle symbol (1) A symbol that is not inside a packet, and is therefore not protected by a CRC. Idle symbols serve to keep links running and synchronized when no other data are being

transmitted. The idle symbol also contains flow-control information. (C/MM) 1596-1992

(2) A symbol that is not inside a packet and is therefore not protected by a CRC. Idle symbols serve to keep links running and synchronized when no other data are being transmitted. The idle symbol also contains flow-control information. (C/MM) 1596.3-1996, 1596-1992

idle time (1) (A) The period of time during which a system or component is operational and in service, but not in use. *Synonym:* standby time. *See also:* down time; busy time; setup time. **(B) (electric drive)** The portion of the available time during which a system is believed to be in good operating condition but is not in productive use. *See also:* electric drive. (C/IA/IAC) 610.12-1990, [60]

(2) That part of up time during which a functional unit is not performing useful operations. *Contrast:* operating time. (C) 610.10-1994w

IDP *See:* integrated data processing.

IDS/1 An extension to COBOL that permits data to be represented in ring type lists. (C) 610.13-1993w

IDT *See:* interdigital transducer.

IEC (1) (television) International Electrotechnical Commission. *Note:* The French name is Commission Electrotechnique Internationale (CEI). (BT/AV) 201-1979w

(2) *See also:* interexchange carrier. (C) 610.7-1995

IED *See:* intelligent electronic device.

IEEE *See:* Institute of Electrical and Electronics Engineers.

IEEE 802 *See:* LAN/MAN Standards Committee.

IEEE 802 LAN (1) A local area network used to carry LLC frames. (LM/C) 802.1H-1995

(2) LAN technologies that provide a MAC Service equivalent to the MAC Service defined in ISO/IEC 15802-1. IEEE 802 LANs include IEEE Std 802.3 (CSMA/CD), ISO/IEC 8802-4 (Token Bus), ISO/IEC 8802-5 (Token Ring), ISO/IEC 8802-6 (DQDB), ISO/IEC 8802-9 (IS-LAN), IEEE Std 802.11 (Wireless), ISO/IEC 8802-12 (Demand Priority), and ISO 9314-2 (FDDI) LANs. *Note:* The connectionless service part of ISO/IEC 8802-6 provides an equivalent MAC Service. (C/LM) 802.1D-1998

IEEE 1284-compatible device *See:* compatible device.

IEEE 1284-compliant device *See:* compliant device.

IEEE 1284-A connector A plug or receptacle 25-pin subminiature D-shell connector. This is the type of connector used on the MS-DOS compatible PC printer port adapter. (C/MM) 1284-1994

IEEE 1284-B connector A plug or receptacle 36-pin ribbon type connector. This type of connector is also known as a "Centronics Connector." (C/MM) 1284-1994

IEEE 1284-C connector A miniature plug or receptacle 36-pin ribbon type connector. (C/MM) 1284-1994

IEEE Standard A standard published by the Institute of Electrical and Electronics Engineers. (C) 610.7-1995

IF *See:* intermediate frequency.

IF-AND-ONLY-IF *See:* equivalence.

IF-AND-ONLY-IF element *See:* IF-AND-ONLY-IF gate.

IF-AND-ONLY-IF gate A gate that performs the Boolean operation of equivalence. *Synonyms:* exclusive-NOR element; IF-AND-ONLY-IF element. (C) 610.10-1994w

IF-A-THEN-NOT-B gate *See:* NAND gate.

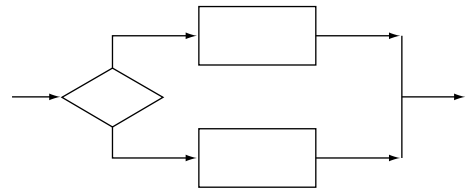
IFIP *See:* International Federation of Information Processing.

IFF *See:* identity friend or foe.

IF-THEN *See:* implication.

IF-THEN element *See:* IF-THEN gate.

if-then-else A single-entry, single-exit two-way branch that defines a condition, specifies the processing to be performed if the condition is met and, optionally, if it is not, and returns control in both instances to the statement immediately following the overall construct. *Contrast:* go to; jump; case. *See also:* dyadic selective construct; monadic selective construct.



if-then-else construct

(C) 610.12-1990

IF-THEN gate A gate that performs the Boolean operation of implication. *Synonym:* IF-THEN element. (C) 610.10-1994w

IGES *See:* Initial Graphics Exchange Specification.

IGFET *See:* insulated-gate field-effect transistor.

ignition *See:* breakdown; sparkover.

ignition control Control of the starting instant of current flow in the anode circuit of a gas tube. *See also:* electronic controller. (IA/ICTL/IAC) [60]

ignition switch A manual or automatic switch for closing or interrupting the electric ignition circuit of an internal-combustion engine at the option of the machine operator, or by an automatic function calling for unattended operation of the engine. *Note:* Provisions for checking individual circuits of the ignition system for relative performance may be incorporated in such switches. *See also:* switch. (IA/ICTL/IAC) [60]

ignition temperature The lowest temperature at which sustained combustion of a material can be initiated under specified conditions. (DEI) 1221-1993w

ignition transformer (power and distribution transformers) Step-up transformer generally used for electrically igniting oil, gas, or gasoline in domestic, commercial, or industrial heating equipment. (PE/TR) C57.12.80-1978r

ignitor A stationary electrode that is partly immersed in the cathode pool and has the function of initiating a cathode spot. *See also:* electrode; electronic controller. (ED) [45]

ignitor-current temperature drift (microwave gas tubes) The variation in ignitor electrode current caused by a change in ambient temperature of the tube. *See also:* gas tube. (ED) 161-1971w

ignitor discharge (microwave switching tubes) (nonlinear, active, and nonreciprocal waveguide components) A direct-current glow discharge between the ignitor electrode and a suitably located electrode, used to facilitate radio-frequency ionization. *See also:* gas tube. (MTT) 457-1982w

ignitor electrode (microwave switching tubes) An electrode used to initiate and sustain the ignitor discharge. *See also:* gas tube. (ED) 161-1971w

ignitor firing time (microwave switching tubes) (nonlinear, active, and nonreciprocal waveguide components) The time interval between the application of a direct voltage to the ignitor electrode and the establishment of the ignitor discharge. *See also:* gas tube. (MTT) 457-1982w

ignitor interaction (microwave gas tubes) The difference between the insertion loss measured at a specified ignitor current and that measured at zero ignitor current. *See also:* gas tube. (ED) 161-1971w

ignitor leakage resistance (microwave switching tubes) The insulation resistance, measured in the absence of an ignitor discharge, between the ignitor electrode terminal and the adjacent radio-frequency electrode. *See also:* gas tube. (ED) 161-1971w

ignitor oscillations (microwave gas tubes) Relaxation oscillations in the ignitor circuit. *Note:* If present, these oscillations may limit the characteristics of the tube. *See also:* gas tube. (ED) 161-1971w

ignitor voltage drop (microwave switching tubes) The direct voltage between the cathode and the anode of the ignitor discharge at a specified ignitor current. *See also:* gas tube. (ED) 161-1971w

ignitron A single-anode pool tube in which an ignitor is employed to initiate the cathode spot before each conducting period. *See also:* electronic controller. (ED) 161-1971w

ignored Used to describe an instruction field, the contents of which are arbitrary and have no effect on the execution of the instruction. The contents of an ignored field will continue to be ignored in future versions of the architecture. *See also:* unused; reserved. (C/MM) 1754-1994

ignored conductor *See:* isolated conductor.

IH *See:* intermediate hub.

ihandle A cell-sized datum identifying a particular package instance. (C/BA) 1275-1994

IIL *See:* integrated injection logic.

IITRAN A programming language similar to PL/1; designed for use as an educational tool. (C) 610.13-1993w

ILD *See:* injection laser diode.

illegal character A character or combination of bits that is not valid according to some criteria; for example, a character that is not a member of some specified alphabet. *Synonyms:* forbidden character; improper character. *Contrast:* forbidden combination. (C) 610.5-1990w

Illegal Command (ILC) bit A bit in the Bus Error register of all S-modules. An S-module sets this bit to indicate that the module has received an illegal command. (TT/C) 1149.5-1995

Illegal Port Selected (IPS) bit A bit in the Bus Error register of all S-modules. An S-module sets this bit to indicate that the module has received a command addressed to an unsupported port. (TT/C) 1149.5-1995

illuminance The unit density of light flux (lm/unit area) that is incident on a surface. (IA/PSE) 241-1990r

illuminance, $E = d\Phi/dA$ (illuminating engineering) The density of the luminous flux incident at a point on a surface. Average illuminance is the quotient of the luminous flux incident on a surface by the area of the surface. (EEC/IE) [126]

illuminance (footcandle or lux) meter (1) (illuminating engineering) An instrument for measuring illuminance on a plane. Instruments that accurately respond to more than one spectral distribution are color corrected; that is, the spectral response is balanced to $V(\lambda)$ or $V'(\lambda)$. Instruments that accurately respond to more than one spatial distribution of incident flux are cosine corrected; that is, the response to a source of unit luminous intensity, illuminating the detector from a fixed distance and from different directions decreases as the cosine of the angle between the incident direction and the normal to the detector surface. The instrument is comprised of some form of photodetector with or without a filter driving a digital or analog readout through appropriate circuitry. (EEC/IE) [126]
(2) (television) *See also:* illumination. (BT/AV) 201-1979w

illumination* **(1) (illuminating engineering)** An alternate, but deprecated, term for illuminance. It is frequently used since illuminance is subject to confusion with luminance and illuminants, especially when not clearly pronounced. *Note:* The term illumination also is commonly used in a qualitative or general sense to designate the act of illuminating or the state of being illuminated. Usually the context will indicate which meaning is intended, but occasionally it is desirable to use the expression level of illumination to indicate that the quantitative meaning is intended. (EEC/IE) [126]
(2) (A) (television) (general) The density of the luminous flux incident on a surface; it is the quotient of the luminous flux by the area of the surface when the latter is uniformly illuminated. **(B) (television)** (at a point of a surface) The quotient of the luminous flux incident on an infinitesimal element of surface containing the point under consideration by the area of that element. *Notes:* 1. The term illumination also is commonly used in a qualitative or general sense to designate the act of illuminating or the state of being illuminated. Usually the context will indicate which meaning is intended, but occasionally it is desirable to use the expression level of illumination to indicate that the quantitative meaning is intended. The term illuminance, which sometimes is used in place of illumination, is subject to confusion with luminance and illuminates, especially when not clearly pronounced. 2. The units of measurements are: footcandle (lumen per square foot, lm/ft^2 lux (lumen per square meter, lx or lm/m^2). This unit of illumination is recommended by the IEC phot (lumen per square centimeter, lm/cm^2). (BT/ED/AV) 201-1979, [127]
(3) *See also:* aperture illumination. (ANT)
* Deprecated.

illumination (footcandle) meter An instrument for measuring the illumination on a surface. *Note:* Most such instruments consist of barrier-layer cells connected to a meter calibrated in footcandles. *See also:* photometry. (EEC/IE) [126]

illumination sensitivity (camera tubes or phototubes) The quotient of signal output current by the incident illumination, under specified conditions of illumination. *Notes:* 1. Since illumination sensitivity is not an absolute characteristic but depends on the spectral distribution of the incident flux, the term is commonly used to designate the sensitivity to radiation from a tungsten-filament lamp operating at a color temperature of 2870 K. 2. Illumination sensitivity is usually measured with a collimated beam at normal incidence. *See also:* transfer characteristic. (ED) 161-1971w

illuminator That part of a semiactive guidance missile weapon system that radiates electromagnetic waves in the direction of a designated target so that echo signals reflected from the illuminated target can be used by another sensor (the missile seeker) for purposes of homing. (AES) 686-1997

illustration Material that is labeled, numbered, set apart from the main body of text, and, normally, cited within the main text. (C/SE) 1063-1987r

illustrative diagram A diagram whose principal purpose is to show the operating principle of a device or group of devices without necessarily showing actual connections or circuits. Illustrative diagrams may use pictures or symbols to illustrate or represent devices or their elements. Illustrative diagrams may be made of electric, hydraulic, pneumatic, and combination systems. They are applicable chiefly to instruction books, descriptive folders, or other media whose purpose is to explain or instruct. *See also:* control. (IA/ICTL/IAC) 270-1966w, [60]

ILS *See:* instrument landing system.

ILS reference point A point on the centerline of the ILS runway designated as the optimum point of contact for landing: in International Civil Aviation Organization standards this point is from 150 to 300 meters (500 to 1000 feet) from the approach end of the runway. (AES/RS) 686-1982s

image (1) (optoelectronic device) A spatial distribution of a physical property, such as radiation, electric charge, conductivity, or reflectivity, mapped from another distribution of either the same or another physical property. *Note:* The mapping process may be carried out by a flux of photons, electric charges, or other means. *See also:* optoelectronic device. (ED) [46]
(2) (computer graphics) A displayed or drawn representation. (C) 610.6-1991w
(3) (image processing and pattern recognition) A two-dimensional representation of a scene. *Synonym:* picture. *See also:* digital image. (C) 610.4-1990w
(4) (A) In image processing, a two-dimensional representation of a scene. **(B)** In graphics, a displayed or drawn representation. (C) 610.10-1994
(5) *See also:* card image.

Image The data structure contained in the Load Server that the Loadable Device wishes to load. (C) 15802-4-1994

image analysis The process of describing or evaluating an image in terms of its parts, properties, and relationships. (C) 610.4-1990w

image antenna The imaginary counterpart of an actual antenna, assumed for mathematical purposes to be located below the surface of the ground and symmetrical with the actual antenna above ground. *See also:* antenna. (AP/ANT) [35]

image area In micrographics, that part of the film frame reserved for an image. (C) 610.2-1987

image attenuation The real part of the image transfer constant. *See also:* image transfer constant. (CAS) [13]

image burn *See:* retained image.

image camera tube *See:* image tube.

image compression The process of eliminating redundancy or approximating an image in order to represent the image in a more compact manner. *See also:* lossless encoding; adaptive coding; run length encoding; interframe coding; predictive coding; contour encoding. (C) 610.4-1990w

image converter (solid state) An optoelectronic device capable of changing the spectral characteristics of a radiant image. *Note:* Examples of such changes are infrared to visible and x ray to visible. *See also:* optoelectronic device. (ED) [46]

image-converter panel A thin, usually flat, multicell image converter. *See also:* optoelectronic device. (ED) [46]

image-converter tube (camera tubes) An image tube in which an infrared or ultraviolet image input is converted to a visible image output. *See also:* camera tube. (ED) [45]

image dissector (1) (optical character recognition) (computers) A mechanical or electronic transducer that sequentially detects the level of light in different areas of a completely illuminated sample space. (C) [20], [85]

(2) In optical character recognition, a mechanical or electronic device that sequentially detects the level of light intensity in different areas of a completely illuminated sample space. (C) 610.2-1987

image dissector tube (dissector tube) A camera tube in which an electron image produced by a photoemitting surface is focused in the plane of a defining aperture and is scanned past that aperture. *See also:* television. (ED) 161-1971w

image element (optoelectronic device) The smallest portion of an image having a specified correlation with the corresponding portion of the original. *Note:* In some imaging systems the size of the image elements is determined by the structure of the image space, in others by the carrier employed for the mapping process. *See also:* optoelectronic device. (ED) [46]

image enhancement The process of improving the appearance of an image by using techniques such as contrast stretching, edge enhancement, gray scale manipulation, smoothing, and sharpening. (C) 610.4-1990w

image frequency (heterodyne frequency converters in which one of the two sidebands produced by beating is selected) An undesired input frequency capable of producing the selected frequency by the same process. *Note:* The word image implies the mirrorlike symmetry of signal and image frequencies about the beating-oscillator frequency or the intermediate frequency, whichever is the higher. *See also:* radio receiver. (EEC/PE) [119]

image guide A planar dielectric waveguide composed of one or more dielectric strips of finite width affixed to one side of a single extended conducting ground plane. (MTT) 1004-1987w

image iconoscope A camera tube in which an electron image is produced by a photoemitting surface and focused on one side of a separate storage target that is scanned on the same side by an electron beam, usually of high-velocity electrons. *See also:* television. (ED) 161-1971w

image impedances (transducer) The impedances that will simultaneously terminate all of its inputs and outputs in such a way that at each of its inputs and outputs the impedances in both directions are equal. *Note:* The image impedances of a four-terminal transducer are in general not equal to each other, but for any symmetrical transducer the image impedances are equal and are the same as the iterative impedances. *See also:* self-impedance; transducer. (IM/HFIM) [40]

image intensifier (solid state) An optoelectronic amplifier capable of increasing the intensity of a radiant image. *See also:* optoelectronic device. (ED) [46]

image-intensifier panel A thin, usually flat, multicell image intensifier. *See also:* optoelectronic device. (ED) [46]

image-intensifier tube An image tube in which the output radiance is in approximately the same spectral region as, and substantially greater than, the photocathode irradiance. *See also:* image tube; camera tube. (ED) [45]

image line A planar dielectric waveguide composed of one or more dielectric strips of finite width affixed to one side of a single extended conducting ground plane. (MTT) 1004-1987w

image matching An image processing technique in which similar patterns are detected by comparing corresponding points of two images. *See also:* template matching. (C) 610.4-1990w

image memory A discrete portion of memory used to hold a representation of an image. *Note:* Sometimes known as a display buffer, or a bit map. *See also:* video RAM. (C) 610.10-1994w

image operator A function that transforms an input image into an output image. *Synonyms:* image transform operator; image transform. *See also:* point operator; neighborhood operator. (C) 610.4-1990w

image orthicon A camera tube in which an electron image is produced by a photoemitting surface and focused on a separate storage target, which is scanned on its opposite side by a low-velocity electron beam. (ED) 161-1971w

image parameters Fundamental network functions, namely image impedances and the image transfer function, that are used to design or describe a filter. *See also:* image transfer constant; image impedances. (CAS) [13]

image phase The imaginary part of the image transfer constant. *See also:* image transfer constant. (CAS) [13]

image phase constant The imaginary part of the image transfer constant. *See also:* transfer constant; transducer. (Std100) 270-1966w

image processing The manipulation of images by computer. *Synonym:* picture processing. *See also:* change detection; edge linking; congruencing; thinning; sampling. (C) 610.4-1990w

image ratio (heterodyne receiver) The ratio of the field strength at the image frequency to the field strength at the desired frequency, each field being applied in turn, under specified conditions, to produce equal outputs. *See also:* radio receiver. 188-1952w

image reconstruction The process of recovering an image from integrals of its gray levels taken along thin strips or slices of the image. (C) 610.4-1990w

image registration The process of positioning two images of the same scene with respect to one another so that corresponding points in the images represent the same point in the scene. *See also:* registered images. (C) 610.4-1990w

image response Response of a superheterodyne receiver to the image frequency, as compared to the response to the desired frequency. *See also:* radio receiver. (EEC/PE) [119]

image restoration The process of returning an image to its original condition by reversing the effects of known or estimated degradations. *See also:* geometric correction. (C) 610.4-1990w

image segmentation The process of dividing an image into regions. *Synonym:* object extraction. *See also:* line detection; region growing; edge detection; border detection; tracking. (C) 610.4-1990w

image space *See:* display space.

image storage (diode-type camera tube) The ability of the diode array target to integrate an image for times longer than the conventional frame time. (ED) 503-1978w

image-storage device An optoelectronic device capable of retaining an image for a selected length of time. *See also:* optoelectronic device. (ED) [46]

image-storage panel (optoelectronic device) A thin, usually flat, multicell image-storage device. *See also:* optoelectronic device. (ED) [46]

image-storage tube A storage tube into which the information is introduced by means of radiation, usually light, and read at a later time as a visible output. *See also:* storage tube. (ED) 158-1962w

image transfer constant (electric transducer) (transfer constant) The arithmetic mean of the natural logarithm of the ratio of input to output phasor voltages and the natural logarithm of the ratio of the input to output phasor currents when the transducer is terminated in its image impedances. *Note:* For a symmetrical transducer the transfer constant is the same as the propagation constant. *See also:* transducer. (Std100) 270-1966w

image transform *See:* image operator.

image transformation A transformation composed from the translation, rotation, or scaling of a graphical image. (C) 610.6-1991w

image transform operator *See:* image operator.

image tube An electron tube that reproduces on its fluorescent screen an image of an irradiation pattern incident on its photosensitive surface. *See also:* camera tube. (ED) 161-1971w

imaginary part If a complex quantity is represented by two components $A + jB$, B is called the imaginary part. (CAS) [13]

imaging plane *See:* ground plane.

imaging radar A high-resolution radar whose output is a representation of the radar cross section within the resolution cell (backscatter coefficient) from the object or scene resolved in two or three spatial dimensions. *Note:* The radar may use real aperture (such as a sidelooking airborne radar), synthetic-aperture radar (SAR), inverse synthetic aperture radar (ISAR), interferometric SAR, or tomographic techniques. (AES) 686-1997

I_{max} output The maximum allowable output load current over which the unit under test output voltage is required to be maintained within the specified operational limits. Imax is also known as the rated current. (PEL) 1515-2000

imbedded temperature-detector insulation (rotating machinery) The insulation surrounding a temperature detector, taking the place of a coil separator in its area. (PE) [9]

IMD *See:* intermodulation distortion.

I_{min} output The minimum allowable output load current over which the unit-under-test output voltage is required to be maintained within the specified operational limits. (PEL) 1515-2000

immediate access Access to a storage device or register in which access time is virtually equal to zero. *Note:* Access time measured in nanoseconds is considered to be virtually equal to zero. *Synonyms:* simultaneous access; instantaneous access. (C) 610.5-1990w

immediate access storage A type of storage whose access time is extremely small, relative to those of alternative types of storage. *Synonym:* instantaneous storage. (C) 610.10-1994w

immediate address (1) (computers) An instruction in which an address part contains the value of an operand rather than its address. *See also:* zero-level address. (C) [20], [85]
(2) An instruction address in which the address field is the operand itself. *Synonym:* zero-level address. (C) 610.10-1994w
(3) (software) *See also:* immediate data. (C) 610.12-1990

immediate addressing An addressing mode in which instructions contain the operand itself and not the address of the operand. (C) 610.10-1994w

immediate control *See:* bit steering.

immediate data Data or operands that are contained in the address field of a computer instruction. *Contrast:* n-level address; direct address; indirect address. (C) 610.10-1994w, 610.12-1990

immediate effect An effect of a transaction, which appears to occur between the time the request subaction is accepted and the response subaction is returned. If a bus standard allows CSR transactions to be split, and sufficient time is allowed between the acceptance of a request subaction and the return of a response subaction, an immediate effect can be emulated by a processor on the node. (C/MM) 1212-1991s

immediate entry A read-only memory (ROM) entry that provides a 24-bit immediate data value. (C/BA/MM) 896.10-1997, 896.2-1991w, 1212-1991s

immediate instruction (1) A computer instruction whose address fields contain the values of the operands rather than the operands' addresses. *Contrast:* indirect instruction; direct instruction. *See also:* absolute instruction; immediate data; effective instruction. (C) 610.12-1990
(2) A computer instruction whose address fields contain immediate data, or the values of the operands rather than the operands' addresses. (C) 610.10-1994w

immediate-nonsynchronized ringing (telephone switching systems) An arrangement whereby a pulse of ringing is sent to the called line when the connection is completed, irrespective of the state of the ringing cycle. (COM) 312-1977w

immediate restoration of service (health care facilities) Automatic restoration of operation with an interruption of not more than 10 seconds as applied to those areas and functions served by the Emergency System, except for areas and functions for which Article 700 [of the National Electrical Code] otherwise makes specific provisions. (NESC/NEC) [86]

immediate subclass A subclass, of a class C, having no superclasses that are themselves subclasses of C. (C/PA) 1328-1993w, 1327-1993w, 1224-1993w

immediate subobject One object that is a value of an attribute of another. (C/PA) 1328-1993w, 1224-1993w, 1327-1993w

immediate subordinate An entry in the DIT that is immediately below another entry in the tree. The distinguished name of the immediate subordinate is formed by appending its relative distinguished name to the distinguished name of the other entry. (C/PA) 1328.2-1993w, 1224.2-1993w, 1326.2-1993w, 1327.2-1993w

immediate superclass The superclass, of a class C, having no subclasses that are themselves superclasses of C. (C/PA) 1328-1993w, 1327-1993w, 1224-1993w

immediate superior An entry in the DIT that is immediately above another entry in the tree. The distinguished name of the immediate superior, followed by the relative distinguished name of the other entry, forms the distinguished name of the other entry. Each entry (except the root) has exactly one immediate superior. (C/PA) 1328.2-1993w, 1326.2-1993w, 1327.2-1993w, 1224.2-1993w

immediate superobject One object that contains another among its attribute values. (C/PA) 1328-1993w, 1224-1993w, 1327-1993w

immediate-synchronized ringing (telephone switching systems) An arrangement whereby the ringing cycle starts with a complete interval of ringing sent to the called line when the connection is completed. (COM) 312-1977w

immersed gun (microwave tubes) A gun in which essentially all the flux of the confining magnetic field passes perpendicularly through the emitting surface of the cathode. (ED) [45]

immersion plating The deposition, without application of an external electromotive force, of a thin metal coating upon a less noble metal by immersing the latter in a solution con-

taining a compound of the metal to be deposited. *Synonym:* dip plating. *See also:* electroplating. (EEC/PE) [119]

immittance (linear passive networks) A response function for which one variable is a voltage and the other a current. *Note:* Immittance is a general term for both impedance and admittance, used where the distinction is irrelevant. (CAS) 156-1960w

immittance comparator An instrument for comparing the impedance or admittance of the two circuits, components, etc. *See also:* auxiliary device to an instrument. (IM/HFIM) [40]

immittance converter A two-port circuit capable of making the input immittance of one port (H_{in}) the product of the immittance connected to the other port (H_1) a positive or negative real constant ($\pm 1k$) and some internal immittance (H_i) i.e., $H_{in} = \pm kH_1H_i$. (CAS) [13]

immittance matrix A two-dimensional array of immittance quantities that relate currents to voltages at the ports of a network. (CAS) [13]

immobilized electrolyte (1) Electrolyte in a cell that is retained by either using gelled or absorbed electrolyte technology. (IA/PSE) 446-1995

(2) Electrolyte in a VRLA cell that is retained by using either gelled or absorbed electrolyte technology. (SB) 1189-1996

immunity (to a disturbance) The ability of a device, equipment, or system to perform without degradation in the presence of an electromagnetic disturbance. (EMC) C63.12-1987

immunity to interference The property of a receiver or any other equipment or system enabling it to reject a radio disturbance. *See also:* electromagnetic compatibility. (EMC) [53]

immunological effect Effect pertaining to the immune system. (T&D/PE) 539-1990

immutable class A class for which the set of instances is fixed; its instances do not come and go over time. *Contrast:* mutable class. *See also:* value class. (C/SE) 1320.2-1998

IMPact Avalanche Transit Time oscillator (nonlinear, active, and nonreciprocal waveguide components) A direct dc-rf (direct current to radio frequency) conversion device in which the active element of the oscillator is a p-n junction diode biased into the avalanche breakdown mode. *Synonym:* IMPATT oscillator. (MTT) 457-1982w

impact ionization gain (diode-type camera tube) The dimensionless ratio of the target signal current to the photocathode current which produced this signal, both averaged over a frame time or over a time long compared to the frame time. (ED) 503-1978w

impact printer A printer in which printing results from mechanical impacts with the paper. *Contrast:* nonimpact printer. *See also:* on-the-fly printer; element printer; dot matrix printer; formed character printer. (C) 610.10-1994w

impaired insulation (insulation systems of synchronous machines) The word "impaired" is here used in the sense of causing any change that could disqualify the insulating material for continuously performing its intended function whether creepage spacing, mechanical support, or dielectric barrier action. The electrical and mechanical properties of the insulation must not be impaired by the prolonged application of the hottest spot or limiting observable temperature permitted for the specific insulation class. (REM) [115]

impairment (of signal quality) An undesired change of a signal reducing the telephone transmission performance. Not closed. Impairment may be caused by noise, distortion, or other phenomena. (COM/TA) 823-1989w

IMPATT oscillator *See:* IMPact Avalanche Transit Time oscillator.

IMPDU *See:* initial MAC protocol data unit.

impedance (1) (A) (general) (linear constant-parameter system). The corresponding impedance function with p replaced by jw in which w is real. *Note:* Definitions (A) and (B) are equivalent. **(B) (general)** (linear constant-parameter system). The ratio of the phasor equivalent of a steady-state sine- wave voltage or voltage-like quantity (driving force) to the phasor equivalent of a steady-state sine-wave current or current-like quantity (response). *Note:* Definitions (A) and (B) are equivalent. **(C) (general)** A physical device or combination of devices whose impedance as defined in definition (A) or (B) can be determined. *Note:* This sentence illustrates the double use of the word impedance, namely for a physical characteristic of a device or system [definitions (A) and (B) and for a device definition (C)]. In the latter case, the word impedor may be used to reduce confusion. Definition (C) is a second use of "impedance" and is independent of definitions (A) and (B). *See also:* resistance; feedback impedance; reactance; input impedance; impedance function; network analysis. (Std100) 270-1966

(2) Linear operator expressing the relation between voltage (increments) and current (increments). Its inverse is called the admittance of an electric machine. *Notes:* 1. If a matrix has as its elements impedances, it is usually referred to as impedance matrix. Frequently the impedance matrix is called impedance for short. 2. Usually such impedances are defined with the mechanical angular velocity of the machine at steady state. *See also:* asynchronous machine. (PE/EM) [9]

(3) (two-conductor transmission line) The ratio of the complex voltage between the conductors to the complex current on one conductor in the same transverse plane. (AP/ANT) [35]

(4) (circular or rectangular waveguide) A nonuniquely defined complex ratio of the voltage and current at a given transverse plane in the waveguide, which depends on the choice of representation of the characteristic impedance. *See also:* characteristic impedance; waveguide. (AP/ANT) [35]

(5) (automatic control) (linear system under sinusoidal stimulus) The complex-number ratio of a force-like variable to the resulting velocity-like steady-state variable: a type of transfer function expressed as voltage per unit current, force per unit velocity, pressure difference per unit volume or mass flux, temperature difference per unit heat flux. *See also:* transfer function. (PE/EDPG) [3]

(6) (of a waveguide) A value relating any two of the three quantities, power (P), complex voltage (V), and complex current (I), in a given mode at a specified transverse plane in a waveguide; the value is nonunique, depending on how the voltage and current quantities are defined and on the selected ratio ($V^{2/P}$, P/I^2, or V/I). (MTT) 146-1980w

(7) (broadband local area networks) A measure of the complex resistive and reactive attributes of a component in an alternating-current circuit. (LM/C) 802.7-1989r

(8) The resistance to the flow of alternating current in a circuit. (C) 610.7-1995

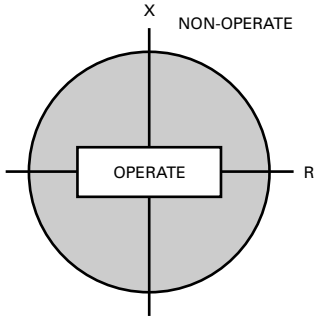
(9) (of a series reactor) The phasor sum of the reactance and effective resistance, expressed in ohms. (PE/TR) C57.16-1996

(10) (shunt reactors over 500 kVA) (of a shunt reactor) The phasor sum of the reactance and resistance, expressed in ohms per phase, it may be derived from the rated kilovoltampere (kVA) and rated voltage. (PE/TR) C57.21-1981s

(11) *See also:* mutual impedance; intrinsic impedance; input impedance; self-impedance. (ANT)

impedance bond (railway practice) An iron-core coil of low resistance and relatively high reactance used on electrified railroads to provide a continuous direct-current path for the return propulsion current around insulated joints and to confine the alternating-current signaling energy to its own track circuit. (EEC/PE) [119]

impedance characteristic A nondirectional relay characteristic in which the threshold of operation for the basic form plots as a circle on an *R-X* diagram, with the reach a constant impedance in all four quadrants. See following figure.



impedance characteristic

(SWG/PE) C37.100-1992

impedance, characteristic wave *See:* characteristic wave impedance.

impedance compensator An electric network designed to be associated with another network or a line with the purpose of giving the impedance of the combination a desired characteristic with frequency over a desired frequency range. *See also:* network analysis. (Std100) 270-1966w

impedance, conjugate *See:* conjugate impedance.

impedance drop (power and distribution transformers) The phasor sum of the resistance voltage drop and the reactance voltage drop. *Note:* For transformers, the resistance drop, the reactance drop, and the impedance drop are, respectively, the sum of the primary and secondary drops reduced to the same terms. They are determined from the load-loss measurements and are usually expressed in per unit, or in percent. (PE/TR) C57.12.80-1978r

impedance, effective input *See:* effective input impedance.

impedance, essentially zero source (transformer electrical tests) Source impedance low enough so that the test currents under consideration would cause less than five percent (5%) distortion (instantaneous) in the voltage amplitude or waveshape at the load terminals. (PEL/ET) 295-1969r

impedance feedback (analog computer) A passive network connected between the output terminal of an operational amplifier and its summing junction. (C) [20], 165-1977w

impedance function (defined for linear constant-parameter systems or parts of such systems) That mathematical function of p that is the ratio of a voltage or voltage-like quantity (driving force) to the corresponding current or current-like quantity (response) in the hypothetical case in which the former is e^{pt} (e is the natural log base, p is arbitrary but independent of t, t is an independent variable that physically is usually time) and the latter is a steady-state response of the form $e^{pt}/Z(p)$. *Note:* In electric circuits voltage is always the driving force and current is the response even though as in nodal analysis the current may be the independent variable: in electromagnetic radiation electric field strength is always considered the driving force and magnetic field strength the response, and in mechanical systems mechanical force is always considered as a driving force and velocity as a response. In a general sense the dimension (and unit) of impedance in a given application may be whatever results from the ratio of the dimensions of the quantity chosen as the driving force to the dimensions of the quantity chosen as the response. However, in the types of systems cited above any deviation from the usual convention should be noted. *See also:* network analysis. (Std100) 270-1966w

impedance grounded (power and distribution transformers) Grounded through impedance. *Note:* The components of impedance and the device to be grounded need not be at the same location.

(SPD/PE/T&D/TR) 32-1972r, C57.12.80-1978r, [8], [10]

impedance grounded neutral system A system whose neutral point(s) are grounded through an impedance (to limit ground fault currents). (PE/C) 1313.1-1996

impedance heating An electric heating system where the object to be heated generates heat as a result of an ac current passing through it. (IA/PC) 844-1991

impedance, image *See:* image impedances.

impedance, input *See:* input impedance.

impedance, intrinsic *See:* intrinsic impedance.

impedance inverter (A) network possessing an input (output) impedance that is proportional to the reciprocal of the load (source) impedance. **(B)** A symmetrical four-terminal network having the impedance inverting and phase characteristics of a quarter-wave length transmission line at its specified frequency or a chain matrix where A, D, O, B, jK and C, j/K (K is a constant relating the input impedance Z to the load impedance Z_L by the relationship Z, K^2/Z_L). (CAS) [13]

impedance irregularity (data transmission) A term used to denote impedance mismatch in a transmission medium. For example, a section of cable in an open-wire line constitutes an impedance irregularity. (PE) 599-1985w

impedance, iterative *See:* iterative impedance.

impedance kilovolt-amperes (1) (regulator) The kilovolt-amperes (kVA) measured in the shunt winding with the series winding short-circuited and with sufficient voltage applied to the shunt winding to cause rated current to flow in the windings. *See also:* voltage regulator. (PE/TR) C57.15-1968s **(2) (rated) (power and distribution transformers)** The kilovolt-amperes (kVA) measured in the excited winding with the other winding short-circuited and with sufficient voltage applied to the excited winding to cause rated current to flow in the winding. (PE/TR) C57.12.80-1978r

impedance, load *See:* load impedance.

impedance, loaded applicator *See:* loaded applicator impedance.

impedance, matching *See:* load matching.

impedance matching (glass industry) (electrical heating applications to melting furnaces and forehearths in the glass industry). The use of a transformer to match line-supply voltage levels to the voltage levels required by the molten-glass load. (IA) 668-1987w

impedance matrix (multiport network) A matrix operator that interrelates the voltages at the various ports to the currents at the same and other ports. (IM/HFIM) [40]

impedance mismatch factor The ratio of the power accepted by an antenna to the power incident at the antenna terminals from the transmitter. *Note:* The impedance mismatch factor is equal to one minus the magnitude squared of the input reflection coefficient of the antenna. (AP/ANT) 145-1993

impedance, normalized *See:* normalized impedance.

impedance, output *See:* output impedance.

impedance permeability (magnetic core testing) An ac permeability related to the total rms exciting current, including harmonics.

$$\mu_z = \frac{B_i}{H_z \mu_0}$$

where

$$H_z = \frac{\sqrt{2}NI}{1}$$

$= $ equivalent peak field strength, amperes/meters
$B_i =$ maximum intrinsic flux density tesla
$I =$ rms exciting current, amperes
$N =$ exciting coil turns

(MAG) 393-1977s

impedance ratio (divider) The ratio of the impedance of the two arms connected in series to the impedance of the low-voltage arm. *Note:* In determining the ratio, account should be taken of the impedance of the measuring cable and the instrument. The impedance ratio is usually given for the frequency range within which it is approximately independent of frequency. For resistive dividers the impedance ratio is generally derived from a direct-current measurement such as

by means of a Wheatstone bridge.
(PE/PSIM) 4-1978s, [55]

impedance ratio factor The ratio of the source impedance, at the point in the system under consideration, to the equivalent total impedance from the source to the converter circuit elements that commutate simultaneously. (IA/SPC) 519-1992

impedance relay (1) A distance relay in which the threshold value of operation depends only on the magnitude of the ratio of voltage to current applied to the relay, and is substantially independent of the phase angle of the impedance.
(SWG/PE) C37.100-1992

(2) A distance relay in which the threshold value of operation depends only on the magnitude of the ratio of voltage to current applied to the relay, and is substantially independent of the phase angle between the applied voltage and current.
(PE/PSR) C37.113-1999

impedance, source *See:* source impedance.

impedance, unloaded applicator *See:* unloaded applicator impedance.

impedance voltage (1) (of a regulator) The voltage required to circulate rated current through one of two specified windings of a transformer when the other winding is short-circuited, with the windings connected as for rated voltage operation. *Note:* It is usually expressed in per unit, or percent, of the rated voltage of the winding in which the voltage is measured.
(PE/TR) C57.12.80-1978r

(2) (constant-current transformer) The measured primary voltage required to circulate rated secondary current through the short-circuited secondary coil for a particular coil separation. *Note:* It is usually expressed in per unit, or percent, of the rated primary voltage. *See also:* constant-current transformer. (PE/TR) [57], C57.12.80-1978r

(3) (current-limiting reactor) The product of its rated ohms impedance and rated current. *See also:* reactor.
C57.16-1958w

(4) (neutral grounding devices) An effective resistance component corresponding to the impedance losses, and a reactance component corresponding to the flux linkages of the winding. (PE/SPD) 32-1972r

(5) The voltage required to circulate rated current through one winding of the regulator when another winding is short-circuited, with the respective windings connected as for a rated voltage operation. Impedance voltage is usually referred to the series winding, and then that voltage is expressed in per unit, or percent, of the rated voltage of the regulator.
(PE/TR) C57.15-1999

impedance voltage drop (1) (of a series reactor) The product of its rated ohms impedance and its rated current.
(PE/TR) C57.16-1996

(2) The phasor sum of the resistance voltage drop and the reactance voltage drop. For regulators, the resistance drop, the reactance drop, and the impedance drop are, respectively, the sum of the primary and secondary drops reduced to the same terms. They are usually expressed in per unit or percent of the rated voltage of the regulator. Since they differ at different operating positions of the regulator, two values of impedance shall be considered, in practice, to be the tap positions that result in the minimum and the maximum impedance. Neutral position has the minimum amount of impedance. (PE/TR) C57.15-1999

impedance, wave *See:* wave impedance.

impedor A device, the purpose of which is to introduce impedance into an electric circuit. *See also:* network analysis.
(Std100) 270-1966w

imperative construct A sequence of one or more steps not involving branching or iteration. (C) 610.12-1990

imperative statement *See:* instruction.

imperfect debugging (software) In reliability modeling, the assumption that attempts to correct or remove a detected fault are not always successful. *See also:* fault; reliability.
(C/SE) 729-1983s

imperfection (crystalline solid) Any deviation in structure from that of an ideal crystal. *Note:* An ideal crystal is perfectly periodic in structure and contains no foreign atoms. *See also:* semiconductor. (ED) 216-1960w

impingement attack Localized erosion-corrosion resulting from turbulent or impinging flow of liquids. (IA) [59]

impingement plume *See:* positive prebreakdown streamers.

implementation (1) (A) (software) The process of translating a design into hardware components, software components, or both. *See also:* coding. **(B) (software)** The result of the process in definition (A). (C) 610.12-1990

(2) Hardware and/or software that conforms to all the specifications of an ISA. (C/MM) 1754-1994

(3) An object providing to applications and users the services defined by this standard. The word *implementation* is to be interpreted to mean that object, after it has been modified in accordance with the manufacturer's instructions to:

— Configure it for conformance with IEEE Std 2003.2-1996;
— Select some of the various optional facilities described by this standard through customization by local system administrators or operators.

An exception to this meaning occurs when discussing conformance documentation or using the term implementation defined. (C/PA) 2003.2-1996

(4) That which implements the requirements of a base standard, or a profile. Test method specifications shall define specifically what an implementation is within the meaning of that specification. Implementation, as used here, is not to be confused with implementation-defined. (C/PA) 2003-1997

implementation architecture The logic structure of a computer system that describes how the functions described by the architecture are carried out. (C) 610.10-1994w

implementation defined (1) An indication that the implementation provider shall define and document the requirements for correct program constructs and correct data of a value or behavior. When the value or behavior in the implementation is designed to be variable or customizable on each instantiation of the system, the implementation provider shall document the nature and permissible ranges of this variation.
(C/PA) 2003.2-1996

(2) (A) Possibly differing between processors, but defined for any particular processor. **(B)** A value or behavior is implementation defined if the implementation defines and documents the requirements for correct program construct and correct data. (C/PA/PAS) 1003.1-1988

(3) An indication that the implementation shall define and document the requirements for correct program constructs and correct data of a value or behavior. (C) 1003.5-1999

implementation-dependent (1) (pascal computer programming language) Possibly differing between processors and not necessarily defined for any particular processor.
(Std100) 812-1984w

(2) Describes an aspect of the architecture that may legitimately vary among implementations of the architecture. In many cases, the permitted range of variation is specified in the standard. When a range is specified, compliant implementations shall not deviate from that range. Compliant implementations shall not add to or deviate from this standard except in aspects described as **implementation-dependent.**
(C/MM) 1754-1994

implementation design *See:* database design.

implementation level The level of verification activities at which system components implementing vital functions are comprehensively identified and analyzed to verify that all functions identified as vital are implemented fail-safely.
(VT/RT) 1483-2000

implementation phase (software verification and validation) (software) The period of time in the software life cycle during which a software product is created from design documentation and debugged. *See also:* test phase; software life cycle; software product. (C/SE) 1012-1986s, 610.12-1990

implementation requirement (software) A requirement that specifies or constrains the coding or construction of a system or system component. *Contrast:* physical requirement; performance requirement; functional requirement; design requirement; interface requirement. (C) 610.12-1990

implementation under test (IUT) (1) The Futurebus+ module that is being tested for conformance. (C/BA) 896.4-1993w

(2) That which implements the standard(s) being tested. An IUT may consist of hardware and software located on different systems. Test method specifications shall define specifically what an implementation is composed of within the meaning of that specification. (C/PA) 2003-1997

implication (1) (mathematics of computing) A dyadic Boolean operator having the property that if P is a statement and Q is a statement, then the expression "P implies Q" is true in all cases except when P is true and Q is false. *Note:* P implies Q is often represented as $P \rightarrow Q$.

Implication Truth Table

P	Q	$P \rightarrow Q$
0	0	1
0	1	1
1	0	0
1	1	1

Synonyms: IF-THEN; conditional implication. (C) 1084-1986w

(2) The dyadic Boolean operation whose result yields the value 0 if and only if the first operand has the value 1 and the second has the value 0. *See also:* IF-THEN gate. (C) 610.10-1994w

implicit address instruction *See:* zero-address instruction.

implicit computation (analog computer) Computation using a self-nulling principle in which, for example, the variable sought is first assumed to exist, after which a synthetic variable is produced according to an equation and compared with a corresponding known variable and the difference between the synthetic and the known variable driven to zero by adjusting the assumed variable. Although the term applies to most analog circuits, even to a single operational amplifier, it is restricted usually to computation performed by (A) circuits in which a function is generated at the output of a single high-gain dc amplifier by inserting an element generating the inverse function in the feedback path, (B) circuits in which combinations of computing elements are interconnected in closed loops to satisfy implicit equations, or (C) circuits in which linear or nonlinear differential equations yield the solutions to a system of algebraic or transcental equations in the steady-state. (C) 165-1977w

implied addressing (1) A method of addressing in which the operation field of an computer instruction implies the address of the operands. For example, if a computer has only one accumulator, an instruction that refers to the accumulator needs no address information describing it. Types include one-ahead addressing, repetitive addressing. *See also:* relative address; indirect address; direct address. (C) 610.12-1990

(2) An addressing mode in which the operation field of an instruction implicitly addresses operands. *See also:* repetitive addressing. (C) 610.10-1994w

implied binary point *See:* assumed binary point.

implied decimal point *See:* assumed decimal point.

implied radix point *See:* assumed radix point.

importance measures A quantitative analysis to determine the importance of variations in equipment reliability to system risk and/or reliability. (PE/NP) 933-1999

imprecision *See:* precision.

impregnant (rotating machinery) A solid, liquid, or semiliquid material that, under conditions of application, is sufficiently fluid to penetrate and completely or partially fill or coat interstices and elements of porous or semiporous substances or composites. (PE) [9]

impregnate (rotating machinery) The act of adding impregnant (bond or binder material) to insulation or a winding. *Note:* The impregnant, if thermosetting, is usually cured in the process. (PE) [9]

impregnated (fibrous insulation) A suitable substance replaces the air between the fibers, even though this substance does not fill completely the spaces between the insulated conductors. *Note:* To be considered suitable, the impregnating substance must have good insulating properties and must cover the fibers and render them adherent to each other and to the conductor. (EEC/PE) [119]

impregnated insulation (insulation systems of synchronous machines) Insulating is considered to be "impregnated" when a suitable substance provides a bond between components of the structure and also a suitable degree of filling and surface coverage sufficient to give adequate performance under the extremes of temperature, surface contamination (moisture, dirt, etc.), and electrical and mechanical stress expected in service. The impregnant must not flow or deteriorate enough at operating temperature so as to seriously affect performance in service. (REM) [115]

impregnated tape *See:* magnetic-powder-impregnated tape.

impregnation, winding *See:* winding impregnation.

impression The process of marking the media. A single-sided, one-color printer requiring one pass per sheet would produce one impression per sheet. A similar printer printing duplex would produce two impressions per sheet. A two-pass printer providing a base color and a highlight color would produce two impressions per side, etc. (C/MM) 1284.1-1997

improper character *See:* illegal character.

improper ferroelectric (primary ferroelectric terms) A ferroelectric in which the polarization is not the primary order parameter. (UFFC) 180-1986w

improper mode Refers to a mode of propagation that cannot be excited by a physical source in the absence of other modes, (e.g., Zenneck surface wave). (AP/PROP) 211-1997

improvement threshold (angle modulation) The condition of unity for the ratio of peak carrier voltage to peak noise voltage after selection and before any nonlinear process such as amplitude limiting and detection. *See also:* amplitude modulation. (AP/ANT) 145-1983s

impulse (1) (automatic control) (mathematics) A pulse that begins and ends within a time so short that it may be regarded mathematically as infinitesimal although the area remains finite. (Std100) 270-1966w

(2) An intentionally applied transient voltage or current that usually rises rapidly to a peak value and then falls more slowly to zero. (PE/PSIM) 4-1995

(3) A surge of unidirectional polarity, for example, a 1.2/50 μs voltage surge. (T&D/PE) 1250-1995

(4) A surge of unidirectional polarity. (SPD/PE) C62.22-1997, C62.62-2000, C62.11-1999

(5) *See also:* transient. (IA/PSE) 1100-1999

impulse bandwidth (1) (electromagnetic site survey) The ratio of the maximum value of the voltage at the output of a network (when properly corrected for network sinewave gain at the stated reference frequency) to the spectrum amplitude of the pulse applied at the input. In networks with a single-humped response the reference frequency is taken as that at which the gain is maximum. (EMC) 473-1985r

(2) (general) When an inpulse is passed through a network with a restricted passband, the output generally consists of a wave train, the envelope of which builds up to a maximum value and then decays approximately exponentially. The impulse bandwidth of such a network is defined as the ratio of that maximum value (when properly corrected for network sine wave gain at a stated reference frequency) to the spectrum amplitude of the pulse applied at the input. In networks with a single humped response, the reference frequency is taken as that at which the gain is maximum. (Overcoupled or stagger-tuned networks should not be used for measurement of spectrum amplitude of impulses.) *See also:* impulse strength. (EMC) 376-1975r

(3) (radio noise from overhead power lines) The peak value of the response envelope divided by the spectrum amplitude

of an applied impulse. *See also:* electromagnetic compatibility. (T&D/PE) 430-1986w, 539-1990

(4) (spectrum analyzer) (non-real time spectrum analyzer) The peak value of the time response envelope divided by the spectrum amplitude (assumed flat within the bandpass) of an applied pulse. (IM) 748-1979w

impulse circuitry (nonlinear, active, and nonreciprocal waveguide components) A term given to the circuitry associated with either a step recovery or a dual mode varactor frequency multiplier. As charge is stored in the multiplier diode during each positive cycle of the input frequency and released during each negative cycle, a magnetic field is built up in an impulse inductor that stores all the circuit energy as charge approaches zero. Multiplication occurs when the inductor releases its energy in the form of an impulse voltage across the diode at the time of switching or high-impedance recovery. (MTT) 457-1982w

impulse current (current testing) Ideally, an aperiodic transient current that rises rapidly to a maximum value and falls usually less rapidly to zero. A rectangular impulse current rises rapidly to a maximum value, remains substantially constant for a specified time and then falls rapidly to zero. (PE/PSIM) 4-1978s

impulse currents (high voltage testing) Two types of impulse currents are dealt with. The first type has a shape which increases from zero to a crest value in a short time, and thereafter decreases to zero, either approximately exponentially or in the manner of a heavily damped sine curve. This type is defined by the virtual front time T1 and the virtual time to half-value T2. The second type has an approximately rectangular shape and is defined by the virtual duration of the peak and the virtual total duration. (PE/PSIM) 4-1978s

impulse current tests *See:* virtual time to half-value; impulse currents; value of the test current; virtual origin; virtual total duration of a rectangular impulse current; virtual duration.

impulse (shock) excitation A method of producing oscillator current in a circuit in which the duration of the impressed voltage is relatively short compared with the duration of the current produced. *See also:* oscillatory circuit. (AP/BT/ANT) 145-1983s, 182-1961w

impulse flashover voltage (1) (insulators) The crest value of the impulse wave that, under specified conditions, causes flashover through the surrounding medium. (EEC/IEPL) [89]

(2) (surge arresters) The crest voltage of an impulse causing a complete disruptive discharge through the air between electrodes of a test specimen. *See also:* insulator; critical impulse flashover voltage. (PE) [8], 64

impulse flashover volt-time characteristic A curve plotted between flashover voltage for an impulse and time to impulse flashover, or time lag of impulse flashover. *See also:* insulator. (PE/T&D) [10]

impulse-forced response (automatic control) The total (transient plus steady-state) time response resulting from an impulse at the input. *Synonym:* impulse response. (PE/EDPG) [3]

impulse generator A standard reference source of broadband impulse energy. (EMC) 263-1965w

impulse inertia (surge arresters) The property of insulation whereby more voltage must be applied to produce disruptive discharge, the shorter the time of voltage application. (PE) [8], 64

impulse insulation level An insulation strength expressed in terms of the crest value of an impulse withstand voltage. *See also:* basic impulse insulation level. (EEC/LB) [100]

impulse noise (1) (A) (data transmission) (overhead-power-line corona and radio noise) Noise characterized by transient disturbances separated in time by quiescent intervals. *Notes:* 1. The frequency spectrum of these disturbances are substantially uniform over the useful pass band of the transmission system. 2. The same source may produce impulse noise in one system and random noise in a different system. *See also:* signal-to-noise ratio. **(B)** Any burst of noise that produces a voltage exceeding the root-mean-square (rms) noise voltage (i.e., the mean noise as measured with a standard noise measuring set using C-message weighting) by a given magnitude. Impulse noise is a spike that exceeds the rms value of the background or quantizing noise by at least 12 dB. The impulse noise counter registers the number of instances in which the measured noise exceeds a preset threshold. (T&D/PE/AP/COM/TA/ANT) 539-1990, 599-1985, 145-1983, 973-1990

(2) A component of the received noise signal that is much greater in amplitude than the normal peaks of the message circuit noise, and that occurs as short-duration spikes or energy bursts. (PE/IC) 1143-1994r

(3) Noise characterized by electrical pulses of high amplitude and narrow width, often originating from switching devices or electrical storms. (C) 610.7-1995

(4) Any burst of noise that produces a voltage exceeding the rms value of the background or quantizing noise by more than 12 dB. (COM/TA) 743-1995

(5) Noise characterized by transient disturbances. Impulses exceeding a specified threshold are counted for a specific duration with an impulse noise counter designed in accordance with IEEE Std 743-1984. (COM/TA) 1007-1991r

impulse-noise selectivity (receiver) A measure of the ability to discriminate against impulse noise. (VT) [37]

impulse protective level For a defined wave shape, the higher of the maximum sparkover value or the corresponding discharge-voltage value. (SPD/PE) C62.11-1999

impulse protective volt-time characteristic The discharge-voltage-time response of the device to impulses of a designated wave shape and polarity, but of varying magnitudes. (SPD/PE) C62.11-1999

impulse radar A radar whose transmitted pulse consists of one or a few cycles of carrier, usually generated by application of a short video pulse to a wideband radio frequency (RF) amplifier (e.g., a traveling-wave tube) or directly to a wideband antenna (e.g., a dipole). (AES) 686-1997

impulse ratio (surge arresters) The ratio of the flashover, sparkover, or breakdown voltage of an impulse to the crest value of the power-frequency, sparkover, or breakdown voltage. (T&D/PE) [10], [8]

impulse relay (A) A relay that follows and repeats current pulses, as from a telephone dial. **(B)** A relay that operates on stored energy of a short pulse after the pulse ends. **(C)** A relay that discriminates between length and strength of pulses, operating on long or strong pulses and not operating on short or weak ones. **(D)** A relay that alternately assumes one of two positions as pulsed. **(E)** Erroneously used to describe an integrating relay. *See also:* relay. (PE/EM) 43-1974

impulse response (1) (linear network) The response, as a function of time, of a network when the excitation is a unit impulse. Hence, the impulse response of a network is the inverse Laplace transform of the network function in the frequency domain. (CAS) [13]

(2) (fiber optics) The function h(t) describing the response of an initially relaxed system to an impulse (Dirac-delta) function applied at time $t = 0$. The root-mean-square (rms) duration, o_{rms}, of the impulse response is often used to characterize a component or system through a single parameter rather than a function:

$$o_{rms} = [1/M_0 \int_{-\infty}^{\infty} (T-t)^2 h(t) dt]^{1/2}$$

where

$$M_0 = \int_{-\infty}^{\infty} h^{(t)dt}$$

$$T = 1/M_0 \int_{-\infty}^{\infty} th^{(t)dt}$$

Note: The impulse response may be obtained by deconvolving the input waveform from the output waveform, or as the

inverse Fourier transform of the transfer function. *See also:* transfer function; root-mean-square pulse duration.
(Std100) 812-1984w

(3) (automatic control) *See also:* impulse-forced response.

impulse rms sound level *See:* impulse root-mean-square sound level.

impulse root-mean-square sound level (measurement of sound pressure levels of ac power circuit breakers) The maximum rms value reached by a sound wave, with the mean (or average) taken over a short, specified time interval. Unit: decibel (dB A, B, or C). For the purposes of IEEE Std C37.082-1982 and IEEE Std C37.100-1992, the averaging time is that given by a resistance-capacitance charging circuit with a 35 millisecond (ms) time constant. Syn: impulse rms sound level. *Synonym:* impulse rms sound level.
(SWG/PE) C37.100-1992, C37.082-1982r

impulses (high voltage testing) An intentionally applied aperiodic transient voltage or current which usually rises rapidly to a peak value and then falls more slowly to zero. Such an impulse is in general well represented by the sum of two exponentials. For special purposes, impulses having approximately linearly rising fronts or of oscillating or approximately rectangular form are used. The term "impulse" is to be distinguished from the term "surge," which refers to transients occurring in electrical equipment or networks in service. (PE/PSIM) 4-1978s

impulse sparkover voltage (1) (gas-tube surge protective devices) (low-voltage air-gap surge-protective devices) The highest value of voltage attained by an impulse of a designated wave shape and polarity applied across the terminals of an arrester prior to the flow of discharge current. Sometimes referred to as surge or impulse breakdown voltage.
(PE/SPD) C62.31-1987r, C62.32-1981s

(2) The highest value of voltage attained by an impulse of a designated wave shape and polarity applied across the terminals of an arrester that will cause gap sparkover prior to the flow of discharge current. (SPD/PE) C62.11-1999

(3) The highest value of voltage attained by an impulse of a designated wave shape and polarity applied across the terminals of a gap-type surge-protective device prior to the flow of discharge current. (SPD/PE) C62.62-2000

impulse sparkover voltage-time curve (gas-tube surge protective devices) (arresters) A curve that relates the impulse sparkover voltage to the time to sparkover.
(SPD/PE) C62.31-1987r

impulse sparkover volt-time characteristic (1) The gap sparkover response of the device to impulses of a designated wave shape and polarity, but of varying magnitudes. *Note:* For an arrester, this characteristic is shown by a graph of crest voltage values plotted against time-to-sparkover.
(SPD/PE) C62.11-1999

(2) The sparkover response of a gap-type surge-protective device, when subjected to voltage impulses that have varying magnitudes and specified wave shape and polarity.
(SPD/PE) C62.62-2000

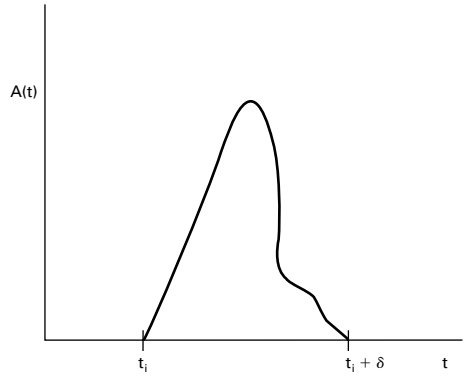
impulse strength The area under the amplitude-time relation for the impulse. *Note:* This definition can be clarified with the aid of the figure below. Let $A(t)$ be some function of time having a value other than zero only between the times t_1 and $t_1 + \delta$. Then let the area under the curve $A(t)$ be designated by σ:

$$\sigma = \int_{\infty}^{\infty} A(t)dt = \int_{t_1}^{t_1+\delta} + A(t)dt$$

To define the theoretical or ideal impulse, let $A(t)$ vary in a reciprocal manner with δ such that the value σ remains constant, so that

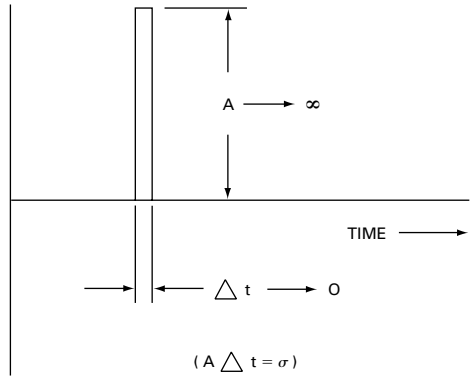
$$\sigma = \lim \delta \rightarrow 0 \int_{t_1}^{t_1+\delta} + A(t)dt$$

In the limit the function $A(t)$ becomes an ideal "impulse" of "strength" σ. As an example, consider the function shown in the second part of the figure. Here a rectangular pulse of finite duration Δt and height A is shown. Now let $A = \sigma/\Delta t$ where σ is (for the present argument) an arbitrary constant, and let $\Delta t \rightarrow 0$. In the limit we have an impulse of strength σ. When $\sigma = 1$, one has a "unit impulse." In many conventional applications the amplitude $A(t)$ has the dimension volts and σ then has the dimension volt-seconds.



pulse of arbitrary shape

impulse strength



rectangular pulse

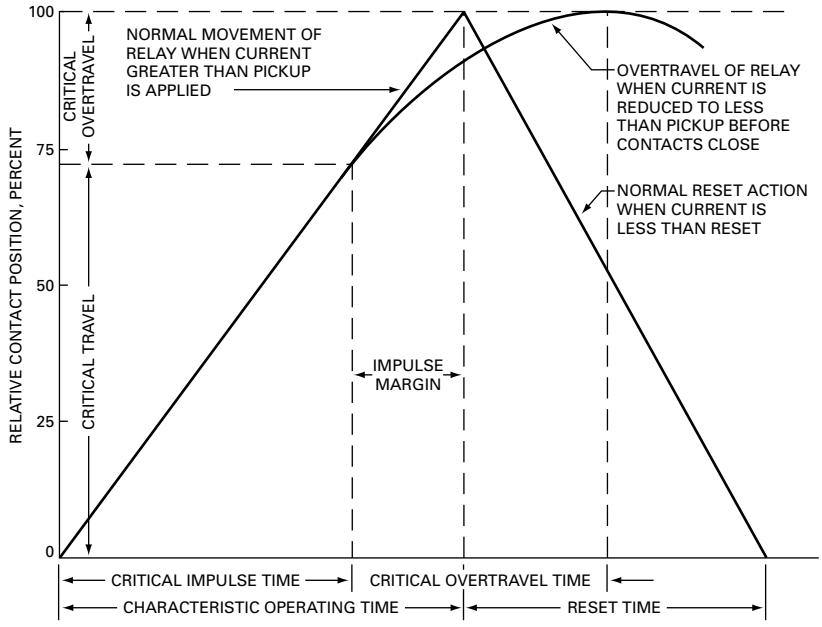
impulse test (1) (rotating machinery) A test for applying to an insulated component an aperiodic transient voltage having predetermined polarity, amplitude, and wave-form. *See also:* asynchronous machine. (SPD/PE) 32-1972r

(2) (surge arresters) (power and distribution transformers) An insulation test in which the voltage applied is an impulse voltage of specified wave shape.
(PE/TR) C57.12.80-1978r

(3) (neutral grounding devices) Dielectric test in which the voltage applied is an impulse voltage of specified wave shape. The wave shape of an impulse test wave is the graph of the wave as a function of time or distance. *Note:* It is customary in practice to express the wave shape by a combination of two numbers, the first part of which represents the wave front and the second the time between the beginning of the impulse and the instant at which one-half crest value is reached on the wave tail, both values being expressed in microseconds, such as a 1.2×50 μs wave. (PE/SPD) 32-1972r

impulse time margin (in the operation of a relay) The difference between characteristic operating times and critical impulse times.
(SWG/EEC/PE/CON/PSR) [28], C37.90-1978s, C37.100-1992

impulse transmission That form of signaling, used principally to reduce the effects of low-frequency interference, that employs impulses of either or both polarities for transmission to indicate the occurrence of transitions in the signals. *Note:* The impulses are generally formed by suppressing the low-frequency components, including direct current, of the signals. *See also:* telegraphy. (EEC/PE) [119]



relationship of relay operating time for electromechanical relays (PSRC)

impulse transmitting relay A relay that closes a set of contacts briefly while going from the energized to the de-energized position or vice versa. *See also:* relay. (EEC/REE) [87]

impulse trip device (low-voltage dc power circuit breakers used in enclosures) A trip device that is designed to operate only by the discharge of a capacitor into its release (trip) coil and is utilized on high-speed circuit breakers to produce the tripping times that are independent of di/dt. (SWG/PE) C37.14-1999

impulse turbine A turbine that uses nozzles to convert water pressure into kinetic energy at atmospheric pressure to develop power. (PE/EDPG) 1020-1988r

impulse-type telemeter A telemeter that employs characteristics of intermittent electric signals, other than their frequency, as the translating means. *See also:* telemetering. (EEC/PE) [119]

impulse voltage (surge arresters) (current) Synonymous with voltage of an impulse wave (current of an impulse wave). (PE) [8], [84]

impulse wave (surge arresters) A unidirectional wave of current or voltage of very short duration containing no appreciable oscillatory components. *See also:* insulator. (PE) [8], [84]

impulse withstand voltage (1) (general) The crest value of an applied impulse voltage that, under specified conditions, does not cause a flashover, puncture, or disruptive discharge on the test specimen. *See also:* surge arrester; insulator. (SPD/PE) 32-1972r

(2) The crest voltage of an impulse that, under specified conditions, can be applied without causing flashover or puncture. (SWG/PE) C37.40-1993, C37.100-1992

(3) The crest value of an impulse that, under specified conditions, can be applied without causing a disruptive discharge. (SPD/PE) C62.11-1999, C62.62-2000

impulsive noise (1) (A) (control of system electromagnetic compatibility) Noise characterized by transient disturbances separated in time by quiescent intervals. *Notes:* 1. The frequency spectrum of these disturbances must be substantially uniform over the useful pass band of the transmission system. 2. The same source may produce an output characteristic of impulsive noise in one system and of random noise in a different system. **(B)** Electromagnetic noise that, when incident on a particular device or equipment, manifests itself as a succession of distinct pulses or transients. *Note:* The frequency spectrum of these disturbances must be substantially uniform over the useful pass band of the transmission system. 2. The same source may produce an output characteristic of impulsive noise in one system and of random noise in a different system. (EMC) C63.12-1984, C63.12-1987

(2) (measurement of sound pressure levels of ac power circuit breakers) A noise characterized by brief excursions of sound pressure (acoustic impulses) which significantly exceed the ambient noise. The duration of a single impulse is usually less than one second. For the purpose of IEEE Std C37.082-1982 and IEEE Std C37.100-1992, the noise produced by the closing or opening of a circuit breaker, or their combination, is classified as impulsive noise. Other components, such as compressor unloader exhausts, may be sources of impulsive noise. (SWG/PE) C37.100-1992, C37.082-1982r

(3) Noise, the effect of which is resolvable into a succession of discrete impulses in the normal operation of the particular system concerned. *See also:* electromagnetic compatibility. (EMC/INT) [53], [70]

impurity (1) (crystalline solid) An imperfection that is chemically foreign to the perfect crystal. *See also:* semiconductor. (ED) 216-1960w

(2) (chemical) (semiconductor) An atom within a crystal, that is foreign to the crystal. *See also:* dopant; semiconductor device. (IA) [12]

impurity, stoichiometric A crystalline imperfection arising from a deviation from stoichiometric composition. (ED) 216-1960w

inaccessible object An object for which the client does not possess a valid designator or handle. (C/PA) 1328-1993w, 1224-1993w, 1327-1993w

inactive (1) (A) Pertaining to a record or file that has not been accessed by an update transaction during a given processing cycle. **(B)** Pertaining to a record that will not be processed by future transactions. *See also:* active; logically deleted; purged. **(C) (696 interface devices) (signals and paths)** A signal in its logically false state. (C/MM) 610.2-1987, 696-1983

(2) When referring to an output driver (e.g., in the phrase *an inactive driver*), this term describes the mode in which the driver is not capable of determining the voltage of the network to which it is connected. (TT/C) 1149.5-1995, 1149.1-1990

inactive mode When the alarm input is in an unmonitored mode for testing. (PE/NP) 692-1997

inactive modules This category contains all the modules that have no need to participate in the control acquisition process in any way. (C/MM) 896.1-1987s

inactive region (1) (of a semiconductor radiation detector) A region of a detector in which charge created by ionizing radiation does not contribute significantly to the output signal. (NPS) 325-1996

(2) (germanium gamma-ray detectors) (charged-particle detectors) (x-ray energy spectrometers) (of a semiconductor radiation detector) A region of a detector in which charge created by ionizing radiation does not contribute significantly to the signal charge. (NPS/NID) 759-1984r, 301-1976s, 300-1988r

inadequate inertia systems An ac system having limited local generation, and therefore rotational inertia, so that the required voltage and frequency cannot be adequately maintained during transient ac or dc faults. (PE/T&D) 1204-1997

inadvertent interchange (1) (control area) (electric power system) The time integral of the net interchange minus the time integral of the scheduled net interchange. *Note:* This includes the intentional interchange energy resulting from the use of frequency and.or other bias as well as the unscheduled interchange energy resulting from human or equipment errors. (PE/PSE) 94-1970w, [54]

(2) The difference between the control area's net actual interchange and net scheduled interchange. (PE/PSE) 858-1993w

inadvertent interchange energy The time integral of a control area's net interchange error. (PE/PSE) 94-1991w

inadvertent write protection The circuitry that is used to prevent writing from occurring when the control signals of the memory enter an uncontrolled state during power on, power off, or noise transients. (ED) 1005-1998

INA JO A computer language used for proving or verifying program correctness. (C) 610.13-1993w

in-band signaling (1) The transmission of a signal using a frequency that is within the bandwidth of the information channel. *Synonym:* in-channel signaling. *Contrast:* out-of-band signaling. (LM/C) 610.7-1995, 802.3-1998

(2) Signaling applications in which the signaling information is transmitted in the same information flow as the data. (C/LM/COM) 802.9a-1995w, 8802-9-1996

(3) Signaling which utilizes frequences within the voice or intelligence band of a channel. (PE) 599-1985w

(4) Analog generated signaling that uses the same path as a message and in which the signaling frequencies are in the same band used for the message. (COM) 312-1977w

in-band tones Typically, a signal on the communication path in the range of 400–3300 Hz. (AMR/SCC31) 1390-1995, 1390.3-1999, 1390.2-1999

in-basket simulation A simulation in which a set of issues is presented to a participant in the form of documents on which action must be taken; for example, a simulation of an unfolding international crisis as a sequence of memos describing relevant events and outcomes of the participant's actions on previous memos. (C) 610.3-1989w

inbound (A) The direction of RF signal flow toward the headend. Referred to in the CATV industry as "upstream" or "reverse." **(B)** The direction of RF signal flow toward the headend location from the user outlet ports. (LM/C) 802.7-1989

inbound queue A queue carrying messages from one or more I/O Unit Functions to a Processor. (C/MM) 1212.1-1993

inbound telemetry Communication initiated by a telemetry interface unit (TIU) toward a utility or enhanced service provider (ESP). (AMR/SCC31) 1390-1995, 1390.2-1999, 1390.3-1999

incandescence (illuminating engineering) The self-emission of radiant energy in the visible spectrum, due to the thermal excitation of atoms or molecules. (EEC/IE) [126]

incandescent filament lamp (illuminating engineering) A lamp in which light is produced by a filament heated to incandescence by an electric current. (EEC/IE) [126]

incandescent-filament-lamp transformer (series type) A transformer that receives power from a current-regulated series circuit and that transforms the power to another circuit at the same or different current from that in the primary circuit. *Note:* If of the insulating type, it also provides protection to the secondary circuit, casing, lamp, and associated luminaire from the high voltage of the primary circuit. (EEC/LB) [97]

in-channel signaling *See:* in-band signaling.

inching (rotating machinery) Electrically actuated angular movement or slow rotation of a machine, usually for maintenance or inspection. *See also:* asynchronous machine; direct-current commutating machine. (PE) [9]

inch-pound units Units based upon the yard and the pound commonly used in the United States of America and defined by the National Institute of Standards and Technology. *Note:* Units having the same names in other countries may differ in magnitude. (SCC14/QUL) SI 10-1997, 268-1982s

incidence angle *See:* angle of incidence.

incident *See:* software test incident.

incidental amplitude-modulation factor (signal generators) That modulation factor resulting unintentionally from the process of frequency modulation and.or phase modulation. *See also:* signal generator. (IM/HFIM) [40]

incidental and restricted radiation Radiation in the radio-frequency spectrum from all devices excluding licensed devices. *See also:* mobile communication system. (VT) [37]

incidental frequency modulation (signal generators) The ratio of the peak frequency deviation to the carrier frequency, resulting unintentionally from the process of amplitude modulation. *See also:* signal generator. (IM/HFIM) [40]

incidental phase modulation (signal generators) The peak phase deviation of the carrier, in radians, resulting unintentionally from the process of amplitude modulation. *See also:* signal generator. (IM/HFIM) [40]

incidental radiation of conducted power (frequency-modulated mobile communications receivers) Radio-frequency energy generated or amplified by the receiver, which is detectable outside the receiver. (VT) 184-1969w

incidental radiator A device that produces radio-frequency energy during the course of its operation, although the device is not intentionally designed to generate or emit radio-frequency energy. Examples of incidental radiators are dc motors, mechanical light switches, etc. (EMC) C63.4-1991

incidental time *See:* miscellaneous time.

incident field That component of the exciting field identical to the field that would have been present in the absence of all particles, surfaces, and volumes. *See also:* exciting field. (AP/PROP) 211-1997

incident wave (1) (forward wave) (uniform guiding systems) A wave traveling along a waveguide or transmission line in a specified direction toward a discontinuity, terminal plane, or reference plane. *See also:* waveguide; reflected wave. (IM/HFIM) [40]

(2) (surge arresters) A traveling wave before it reaches a transition point. (PE) [8], [84]

(3) (waveguide) At a transverse plane in a transmission line or waveguide, a wave traveling in a reference direction. *See also:* reflected wave; transmitted wave. (MTT) 146-1980w

(4) A wave that impinges on a discontinuity in refractive index or a medium of different propagation characteristics. The incident wave is the total field in the absence of the discontinuity. (AP/PROP) 211-1997

incipient An imperfection in the state or condition of equipment that could result in a degraded or immediate failure if corrective action is not taken. (PE/NP) 933-1999

incipient failure A failure that is about to occur. (C) 610.12-1990

incipient failure detection (nuclear power generating station) Tests designed to monitor performance characteristics and detect degradation prior to failure(s) which would prevent performance of the Class 1E functions. *Note:* Incipient failure testing requires module test checks, inspection, etc., on a sufficient time basis to establish performance trends. At the outset, the test cycle and corresponding limits of deviation of module performance or status must be established. Specific parameter trend patterns, exceeding of performance limits shall require that the module be removed and adjusted, replaced or serviced. As used here "sufficient time basis" would never be less than periodic surveillance test interval. In any event the internal must be justified technically based upon such things as manufacturer recommended, periodic preventive maintenance procedures, past operating experience, etc. These module tests require testing on line and/or removal from service. (PE/NP) 381-1977w

in-circuit testing A method of testing a printed circuit assembly by making direct physical contact between automatic test equipment and nets that are connected to the pins of individual components. *See also:* net. (C/TT) 1149.4-1999

inclined-blade blower (rotating machinery) A fan made with flat blades mounted so that the plane of the blades is parallel to and displaced from the axis of rotation of the rotor. *See also:* fan. (PE) [9]

inclined orbit (communication satellite) An orbit of a satellite which is not equatorial, and not polar. (COM) [19]

inclosed *See:* enclosed.

inclusion (1) (fiber optics) Denoting the presence of extraneous or foreign material. (Std100) 812-1984w
(2) (mathematics of computing) *See also:* implication. (C) 1084-1986w

inclusion list *See:* go list.

inclusive NOR gate *See:* NOR gate.

inclusive OR *See:* OR.

inclusive OR gate *See:* OR gate.

incoherent (fiber optics) Characterized by a degree of coherence significantly less than 0.88. *See also:* coherent; degree of coherence. (Std100) 812-1984w

incoherent field *See:* diffuse field.

incoherent sampling Sampling of a waveform such that the relationship between the input frequency, sampling frequency, number of cycles in the data record, and the number of samples in the data record does not meet the definition of coherent sampling. (IM/WM&A) 1057-1994w

incoherent scattering Scattering produced when the wave of an exciting field encounters random fluctuations of complex permittivity or permeability. The fluctuations may be either discrete or continuous (turbid or turbulent in the case of scattering from atmospheric refractive index fluctuations). The scattered fields exhibit random variations in phase and magnitude and thus constitute a zero mean process. (AP/PROP) 211-1997

incoming (local area networks) A link control signal indicating that a packet may soon be sent to the receiving entity. (C) 8802-12-1998

incoming calling line identification (ICLID) Provides calling party data on calls originated from both analog and digital lines. (SCC31) 1390.3-1999

incoming first failure to match *See:* incoming matching loss.

incoming matching loss Incoming matching loss is the matching loss on trunk-to-line connections. It includes the connection of a trunk to an individual line or to any idle line in a multiline hunting group. If only first-trial connections are considered, the loss is termed "incoming first failure to match." (COM/TA) 973-1990w

incoming traffic (telephone switching systems) Traffic received directly from trunks by a switching entity. (COM) 312-1977w

incomplete cluster *See:* partial cluster.

incomplete diffusion (illuminating engineering) That in which the diffusing medium partially redirects the incident flux by scattering while the remaining fraction of incident flux is redirected without scattering, that is, a fraction of the incident flux can remain in an image-forming state. (EEC/IE) [126]

incomplete line A sequence of text consisting of one or more non-⟨newline⟩ characters at the end of the file. (C/PA) 9945-2-1993

incomplete sequence relay (power system device function numbers) A relay that generally returns the equipment to the normal, of off, position and locks it out if the normal starting, operating, or stopping sequence is not properly completed within a predetermined time. If the device is used for alarm purposes only, it should preferably be designated as 48A (alarm). (SUB/PE) C37.2-1979s

in-core sort *See:* internal sort.

incorrect call progress signals Any signal that misleads or confuses a knowledgeable caller. (COM/TA) 973-1990w

Incorrect Packet Count (IPC) bit A bit in the Bus Error register of all S-modules. An S-module sets this bit to indicate that, with respect to a just completed message transfer, either the S-module has received a request for an ACKNOWLEDGE packet and was not given the opportunity to send it or, in the case of an S-module in which the packet counting option is implemented, that it received a different number of packets than was specified in the PACKET COUNT packet. (TT/C) 1149.5-1995

incorrect relaying-system performance Any operation or lack of operation of the relays or associated equipment that, under existing conditions, does not conform to correct relaying-systems performance. (SWG/PE/PE) C37.100-1992, C37.90-1978s

incorrect relay operation Any output response or lack of output response by the relay that, for the applied input quantities, is not correct. (SWG/PE/PSR) C37.100-1992, C37.90-1978s

increment (test pattern language) The action of increasing the arithmetic value of a counter by one. (TT/C) 660-1986w
(2) (A) (mathematics of computing) The quantity by which a variable is increased. **(B) (mathematics of computing)** To increase the value of a variable. *Contrast:* decrement. **(C) (mathematics of computing)** To increase the value of a variable by one. *Contrast:* decrement. (C) 610.10-1994, 1084-1986

incremental backup To perform a backup of a system in which the only data that is stored on the backup is data that has been modified since the last full backup was performed. *Contrast:* full backup. (C) 610.5-1990w

incremental binary representation *See:* binary incremental representation.

incremental compiler A compiler that completes as much of the translation of each source statement as possible during the input or scanning of the source statement. Typically used for on-line computer program development and checkout. *Synonyms:* conversational compiler; online compiler; interactive compiler. (C) 610.12-1990

incremental computer A special-purpose computer that is specifically designed to process changes in the variables as well as the absolute value of the variables themselves, for example, digital differential analyzer. (C/IA/APP) [20], [75], 610.10-1994w

incremental cost of delivered power (source) The additional per-unit cost incurred when supplying another increment of power. (PE/PSE) 94-1991w

incremental cost of reference power (source) The additional per-unit cost incurred when supplying another increment of power to a designated reference point on a transmission system. (PE/PSE) 94-1991w

incremental delivered power (electric power system) The percent of an increment of power delivered from a source to any specific point, such as the system load. (PE/PSE) 94-1991w

incremental development A software development technique in which requirements definition, design, implementation, and testing occur in an overlapping, iterative (rather than sequential) manner, resulting in incremental completion of the overall software product. *Contrast:* waterfall model. *See also:* structured design; stepwise refinement; rapid prototyping; transform analysis; spiral model; object-oriented design; input-process-output; modular decomposition; transaction analysis; data structure-centered design. (C) 610.12-1990

incremental dimension (numerically controlled machines) A dimension expressed with respect to the preceding point in a sequence of points. *See also:* long dimension; normal dimension; dimension; short dimension. (IA/EEC) [61], [74]

incremental energy cost (1) The cost incurred by increasing the production of electric energy above some base level. (PE/PSE) 858-1993w

(2) (electric power supply) The additional cost of producing or transmitting electric energy above some base cost. (PE/PSE) 346-1973w

incremental feed (numerically controlled machines) A manual or automatic input of preset motion command for a machine axis. (IA) [61], [84]

incremental fuel cost of generation (any particular source) The cost, usually expressed in mill.kilowatt-hour, that would be expended for fuel in order to produce an additional increment of generation at any particular source. (PE/PSE) 94-1970w

incremental generating cost (A) (electric power system) (source at any particular value of generation) The ratio of the additional cost incurred in producing an increment of generation to the magnitude of that increment of generation. *Note:* All variable costs should be taken into account including maintenance. **(B)** The additional cost of producing an increment of generation divided by the increment of generation. (PE/PSE) 94-1970, 94-1991

incremental heat rate (A) (steam turbo-generator unit at any particular output) The ratio of a small change in heat input per unit time to the corresponding change in power output. *Note:* Usually, it is expressed in British thermal unit/kilowatt-hour. **(B)** For a steam turbine-generator unit, the rate of a change in heat input per unit of time to the corresponding change in power output. (PE/PSE) 94-1970, 94-1991

incremental hysteresis loss (magnetic material) The hysteresis loss in a magnetic material when it is subjected simultaneously to a biasing and an incremental magnetizing force. (Std100) 270-1966w

incremental inductance The incremental inductance of a smoothing reactor is the inductance of the smoothing reactor, in Henries, determined on the basis of a small current increase (or decrease) at a predefined dc current. The incremental inductance is, therefore, defined as a function of dc current from the minimum current up to the maximum peak short-circuit current. (PE/TR) 1277-2000

incremental induction At a point in a material that is subjected simultaneously to a polarizing magnetizing force and a symmetrical cyclically varying magnetizing force, one-half the algebraic difference of the maximum and minimum values of the magnetic induction at that point. (Std100) 270-1966w

incremental integrator In an analog computer, a digital integrator so modified that the output signal is maximum negative, zero, or maximum positive when the value of the input is negative, zero, or positive. (C) 610.10-1994w

incremental justification In text formatting, the use of extra intercharacter spacing to form even margins. *Contrast:* line filling. (C) 610.2-1987

incremental loading (electric power system) The assignment of loads to generators so that the additional cost of producing a small increment of additional generation is identical for all generators in the variable range. (PE/PSE) 94-1970w

incremental magnetizing force (magnetic material) At a point that is subjected simultaneously to a biasing magnetizing force and a symmetrical cyclic magnetizing force, one-half of the algebraic difference of the maximum and minimum values of the magnetizing force at the point. (Std100) 270-1966w

incremental maintenance cost (A) (electric power system) (any particular source) The additional cost for maintenance that will ultimately be incurred as a result of increasing generation by an additional increment. **(B)** The additional cost for maintenance per increment of power incurred by changing generation level. (PE/PSE) 94-1970, 94-1991

incremental permeability (1) (general) (magnetic induction) The ratio of the cyclic change in the magnetic induction to the corresponding cyclic change in magnetizing force when the mean induction differs from zero. *Note:* In anisotropic media, incremental permeability becomes a matrix. (Std100) 270-1966w

(2) (magnetic core testing) The permeability with stated alternating magnetic field conditions in the presence of a stated static magnetic field.

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

$\mu\Delta$ = relative incremental permeability, ΔH = total cyclic variation of the magnetic field strength, ΔB = corresponding total cyclic change in induction. (MAG) 393-1977s

incremental productivity The productivity computed periodically during development. (C/SE) 1045-1992

incremental representation Any number representation system in which the numerals express changes in the variables rather than the variables themselves. *See also:* binary incremental representation; ternary incremental representation. (C) 1084-1986w

incremental resistance (semiconductor) (forward or reverse of a semiconductor rectifier diode) The quotient of a small incremental voltage by a small incremental current at a stated point on the static characteristic curve. (IA) [12]

incremental sensitivity (instrument) (nuclear techniques) A measure of the smallest change in stimulus that produces a statistically significant change in response. Quantitatively it is usually expressed as the change in the stimulus that produces a change in response equal to the standard deviation of the response. *See also:* ionizing radiation. (NPS) 175-1960w

incremental sweep (oscilloscopes) A sweep that is not a continuous function, but that represents the independent variable in discrete steps. *See also:* oscillograph; stairstep sweep. (IM/HFIM) [40]

incremental tape drive A tape drive capable of handling one character at a time, creating interrecord gaps only when explicitly directed. (C) 610.10-1994w

incremental ternary representation *See:* ternary incremental representation.

incremental time constant (electric coupling) The time constant applicable for a small incremental change of excitation voltage about a specified operating value. (EM/PE) 290-1980w

incremental total dose test A test of the permanent changes induced by radiation obtained by a comparison of characteristics before and after exposure to successively higher increments of integrated total dose levels. (ED) 641-1987w

incremental total test dosage Test of permanent changes induced by radiation that are obtained by a comparison of characteristics before and after exposure to a given integrated total dose level. (ED) 1005-1998

incremental transmission loss (electric power system) The change in power loss incurred when power flow within the transmission network is changed and/or redistributed. (PE/PSE) 94-1991w

incremental vector A representation of test vectors containing only the changing signals and new signal values in each

vector. Parallel vectors can be generated from incremental vectors by maintaining test-specified state information for signals that did not change. (C/TT) 1450-1999

incremental water rate For a hydro turbine-generator unit, the ratio of a change in water input at a constant per unit of time (at a constant net head) to the corresponding change in power output. (PE/PSE) 94-1991w

incremental worth of power (designated point on a transmission system) The additional per-unit cost that would be incurred in supplying another increment of power from any variable source of a system in economic balance to such designated point. *Note:* When the designated point is the composite system load, the incremental worth of power is commonly called lambda or Lagrangian multiplier. (PE/PSE) 94-1970w

increment size The minimum distance between two points or parallel lines of a display surface. *See also:* plotter step size. (C) 610.6-1991w, 610.10-1994w

increment (network) starter A starter that applies starting current to a motor in a series of increments of predetermined value and at predetermined time intervals in closed-circuit transition for the purpose of minimizing line disturbance. One or more increments may be applied before the motor starts. *See also:* starter. (IA/ICTL/IAC/APP) [60], [75]

indefinite admittance matrix (network analysis) A matrix associated with an n-node network whose elements have the dimension of admittance and, when multiplied into the vector of node voltages, gives the vector of currents entering the n nodes. (CAS) [13]

independence (Class 1E equipment and circuits) (Class 1E power systems for nuclear power generating stations) The state in which there is no mechanism by which any single design basis event, such as a flood, can cause redundant equipment to be inoperable. (PE/NP) 384-1992r, 308-1991

independent auxiliary (generating stations electric power system) An item capable of performing its function without dependence on a similar item or the component it serves. (PE/EDPG) [5], 505-1977r

independent ballast (mercury lamp) A ballast that can be mounted separately outside a lighting fitting or fixture. (EEC/LB) [95]

independent basic service set (IBSS) A BSS that forms a self-contained network, and in which no access to a distribution system (DS) is available. (C/LM) 8802-11-1999

independent biaxial test (seismic testing of relays) The horizontal and the vertical acceleration components are derived from two different input signals, which are phase incoherent. (SWG/PE/PSR) C37.98-1977s, C37.100-1992

independent conformity *See:* conformity.

independent contact A contacting member designed to close one circuit only. (EEC/PE) [119]

independent copy A copy of the object plus independent copies of all its subobjects (applied recursively). (C/PA) 1328-1993w, 1327-1993w, 1224-1993w

independent disk array A form of RAID storage, known as levels 4 and 5, in which the individual drives within the array may be accessed. *Note:* With level 4, all data drives use a common parity drive and with level 5, parity is performed across all drives. (C) 610.10-1994w

independent entity An entity for which each instance can be uniquely identified without determining its relationship to another entity. *Synonym:* identifier-independent entity. *Contrast:* dependent entity. (C/SE) 1320.2-1998

independent firing The method of initiating conduction of an ignitron by obtaining power for the firing pulse in the ignitor from a circuit independent of the anode circuit of the ignitron. *See also:* electronic controller. (IA/ICTL/IAC) [60]

independent ground electrode (surge arresters) A ground electrode or system such that its voltage to ground is not appreciably affected by currents flowing to ground in other electrodes or systems. (PE) [8], [84]

independent linearity *See:* linearity of a signal.

independently powered An adjective used to describe a node on a bus, when the node's power supply may fail while other nodes remain powered and operational. (C/MM) 1212-1991s

independent manual operation (of a switching device) A stored-energy operation where manual energy is stored and released, such that the speed and force of this operation are independent of the action of the attendant. (SWG/PE) C37.100-1992

independent operation The ability, when supplied with appropriate energy, and with control signals from internal sources or through one or more coupler interfaces, to perform all of the functions of which the installed equipment is intended to be capable. (VT) 1473-1999

independent pole tripping The application of multipole circuit breakers in such a manner that a malfunction of one or more poles or associated control circuits will not prevent successful tripping of the remaining pole(s). *Notes:* 1. Circuit breakers used for independent pole tripping must inherently be capable of individual pole opening. 2. Independent pole tripping is applied on ac power systems to enhance system stability by maximizing the probability of clearing at least some phases of a multiphase fault. (SWG/PE) C37.100-1992

independent power operation An operation by means of energy other than manual where the completion of the operation is independent of the continuity of the power supply. (SWG/PE) C37.100-1992

independent state class A state class that is not a dependent state class. *Contrast:* dependent state class. (C/SE) 1320.2-1998

independent telephone company A company not associated with a regional Bell operating company (non-Bell operating company). (AMR/SCC31) 1390-1995, 1390.2-1999, 1390.3-1999

independent transformer A transformer that can be mounted separately outside a luminaire. (EEC/LB) [98]

independent variable A variable whose value is not dependent on the values of other variables. *Contrast:* dependent variable. (C) 610.3-1989w

independent verification and validation (IV&V) (1) (software) Verification and validation performed by an organization that is technically, managerially, and financially independent of the development organization. (C) 610.12-1990

(2) Systematic evaluation of software products and activities by an organization that is not responsible for developing the product or performing the activity being evaluated. (C/SE) J-STD-016-1995

(3) V&V processes performed by an organization with a specified degree of technical, managerial, and financial independence from the development organization. (C/SE) 1012-1998

Independent Virtual Local Area Network (VLAN) Learning (IVL) Configuration and operation of the Learning Process and the Filtering Database such that, for a given set of VLANs, if a given individual MAC Address is learned in one VLAN, that learned information is not used in forwarding decisions taken for that address relative to any other VLAN in the given set. *Note:* In a Bridge that supports only IVL operation, the "given set of VLANs" is the set of all VLANs. (C/LM) 802.1Q-1998

Independent Virtual Local Area Network (VLAN) Learning (IVL) Bridge A type of Bridge that supports only Independent VLAN Learning. (C/LM) 802.1Q-1998

index (A) (electronic computation) An ordered reference list of the contents of a file or document, together with keys or reference notations for identification or location of those contents. **(B) (electronic computation)** A symbol or a number used to identify a particular quantity in an array of similar quantities. For example, the terms of an array represented by X1, X2, . . . , X100 have the indexes 1, 2, . . . , 100, respec-

tively. **(C) (electronic computation)** Pertaining to an index register. (C) [20], [85]
(2) (A) (data management) A data item that identifies a particular element in a set of items such as an array. **(B) (data management)** A list or table used to locate records within an indexed file that contains the location and unique key value of each record. *Synonym:* directory. *See also:* alternate index; cross-index. **(C) (data management)** To prepare a table as in definition (B). (C) 610.5-1990

indexed access The process of accessing stored data in such a way that indices are used to locate records within data storage. *Synonym:* keyed access. *See also:* indexed sequential access. (C) 610.5-1990w

indexed address An address that must be added to the contents of an index register to obtain the address of the storage location to be accessed. *Synonym:* variable address. *See also:* self-relative address; offset; relative address.
(C) 610.12-1990, 610.10-1994w

indexed addressing An addressing mode in which an index register or index word is used to permit automatic modification of the referred address without altering the instruction. *Note:* Particularly useful when programming repetitive instruction sequences on many sets of data.
(C) 610.10-1994w

index dip (fiber optics) A decrease in the refractive index at the center of the core, caused by certain fabrication techniques. Sometimes called profile dip. *See also:* refractive index profile. (Std100) 812-1984w

indexed file A file that may be accessed using an index. *Contrast:* partitioned data set; sequential file.
(C) 610.5-1990w

indexed segment In a database, a segment that is located by an indexing segment. *Synonym:* index target segment.
(C) 610.5-1990w

indexed sequential access The process of accessing stored data using the indexed sequential access mode. *Contrast:* direct access; sequential access. *See also:* indexed access.
(C) 610.5-1990w

indexed sequential access method (ISAM) An access method by which data records may be stored and retrieved using either the sequential access method or the direct access method. *See also:* basic sequential access method; virtual sequential access method. (C) 610.5-1990w

indexed sequential access mode An access mode in which data records may be stored and retrieved using either direct access mode or sequential access mode. *Note*: The records are actually stored in a sequential fashion, but an index is maintained to allow direct access. *Contrast:* direct access mode; sequential access mode. (C) 610.5-1990w

INDEX file The file within an exported catalog containing the metadata describing the software objects and attributes for all bundles, products, subproducts and filesets.
(C/PA) 1387.2-1995

index hole A hole found in hard-sectored media, such as magnetic disks, or paper tape, in which the hole indicates the start of the first sector, the first record, or the top of the form. *Contrast:* index mark. (C) 610.10-1994w

indexing segment In a database, a segment that contains a pointer to another segment, called the indexed segment, containing data. *Synonym:* index pointer segment.
(C) 610.5-1990w

index mark A mark found on soft-sectored media, such as magnetic disks, in which a magnetic indicator is placed on the disk to indicate the beginning of each track within the sector. *Synonym:* address mark. (C) 610.10-1994w

index matching material (fiber optics) A material, often a liquid or cement, whose refractive index is nearly equal to the core index, used to reduce Fresnel reflections from a fiber end face. *See also:* mechanical splice; refractive index; Fresnel reflection. (Std100) 812-1984w

index of cooperation, international (facsimile in rectilinear scanning) The product of the total length of a scanning or recording line by the number of scanning or recording lines per unit length divided by pi. *Notes:* 1. For rotating devices the index of cooperation is the product of the drum diameter times the number of lines per unit length. 2. The prior IEEE index of cooperation was defined for rectilinear scanning or recording as the product of the total line length by the number of lines per unit length. This has been changed to agree with international standards. (COM) 168-1956w

index of illuminant metamerism (illuminating engineering) (of two objects that are metameric when illuminated by a reference source) Measure of the degree of color difference between the two objects when a specified test source is substituted for the reference source. (EEC/IE) [126]

index of observer metamerism (illuminating engineering) (of two objects that are metameric when viewed by a reference observer) Measure of the degree of color difference between the two objects when a specfied test observer is substituted for the reference observer. (EEC/IE) [126]

index of refraction *See:* refractive index.

index of sensation (illuminating engineering) (of a source) A number that expresses the effects of source luminance (L_s), solid angle factor (Q), position index (P), and the field luminance (F) on discomfort glare rating.

$$M = \frac{L_{sQ}}{PF^{0.44}}$$

(See solid angle factor for an equation defining Q). *Note:* A restatement of this formula lends itself more directly to computer applications. *See also:* discomfort glare rating.
(EEC/IE) [126]

index pointer segment *See:* indexing segment.

index profile (fiber optics) In an optical waveguide, the refractive index as a function of radius. *See also:* step index profile; profile parameter; power-law index profile; profile dispersion parameter; parabolic profile; graded index profile; profile dispersion. (Std100) 812-1984w

index register (1) (computers) A register whose content is added to or subtracted from the operand address prior to or during the execution of an instruction. (MIL/C) [2], [85]
(2) A register whose contents can be used to modify an operand address during the execution of computer instructions; it can also be used as a counter. *Note:* may be used to control the execution of a loop, to control the use of an array, for table lookup or as a pointer. *Synonyms:* cycle counter; B-box; B-line. (C) 610.10-1994w

index target segment *See:* indexed segment.

index word In indexed addressing, a word containing an index modifier that is applied to the address field of a computer instruction. (C) 610.10-1994w

indicated bearing (direction finding systems) A bearing from a direction-finder site to a target transmitter obtained by averaging several readings: the indicated bearing is compared to the apparent bearing to determine accuracy of the equipment. *See also:* navigation. (AES/RS) 686-1982s, [42]

indicated bearing offset (navigation aid terms) (direction finder [DF] installations) The mean different between the indicated and apparent bearings of a number of signal sources, the sources being, for the most part, uniformly distributed in azimuth. (AES/GCS) 172-1983w

indicated value (A) (power meters) The uncorrected value determined by observing the indicating display of the instrument. **(B)** A scale reading or displayed value.
(IM/NI) 470-1972, 544-1975, N42.17B-1989

indicating circuit That portion of the control circuit of a control apparatus or system that carries the results of logic functions to visual or audible devices that indicate the state of the apparatus controlled. (IA/MT) 45-1998

indicating control switch A switch that indicates its last control operation. (SWG/PE) C37.100-1992

indicating demand meter (metering) A demand meter equipped with a readout that indicates demand, maximum demand, or both. (ELM) C12.1-1982s

indicating fuse A fuse that automatically indicates that the fuse has interrupted the circuit. (SWG/PE) C37.40-1993, C37.100-1992

indicating instrument (glass industry) (electrical heating applications to melting furnaces and forehearths in the glass industry) An instrument in which only the present value of the quantity measured is visually indicated. (IA) 668-1987w

indicating or recording mechanism (demand meter) That mechanism that indicates or records the measurement of the electrical quantity as related to the demand interval. *Note:* This mechanism may be operated directly by and be a component part of the electric mechanism, or may be structurally separate from it. The demand may be indicated or recorded in kilowatts, kilovolt-amperes, amperes, kilovars, or other suitable units. This mechanism may be of an indicating type, indicating by means of a pointer related to its position on a scale or by means of the cumulative reading of a number of dial or cyclometer indicators: or a graphic type, recording on a circular or strip chart: or of a printing type, recording on a tape. It may record the demand for each demand interval or may indicate only the maximum demand. *See also:* demand meter. (EEC/PE) [119]

indicating scale (recording instrument) A scale attached to the recording instrument for the purpose of affording an easily readable value of the recorded quantity at the time of observation. *Note:* For recording instruments in which the production of the graphic record is the primary function, the chart scale should be considered the primary basis for accuracy ratings. For instruments in which the graphic record is secondary to a control function the indicating scale may be more accurate and more closely related to the control than is the chart scale. *See also:* moving element. (EEC/PE) [119]

indication (1) (supervisory control, data acquisition, and automatic control) (station control and data acquisition) An audio or visual signal that signifies a particular condition. (PE/SUB) C37.1-1994

(2) A light or other signal (audio or visual) provided by the man/machine interface that signifies a particular condition. (SWG/PE) C37.100-1992

(3) A mechanism informing an entity of the occurrence of an event in a lower layer entity. Alternatively, an indication may provide evidence of a request by a remote station entity. (EMB/MIB) 1073.4.1-2000

indication (status) function The capability of a supervisory system to accept, record, or display, or do all of these, the status of a device. The status of a device may be derived from one or more inputs giving the following two or more states of indication: *Two-state indication.* Only one of the two possible positions of the supervised device is displayed at one time. Such display may be derived from a single set of contacts.; *Three-state indication.* One in which the transitional state or security indication as well as the terminal positions of the supervised device is displayed. Such a display is derived from at least two sets of initiating contacts; *Multistate indication.* Only one of the predefined states (transitional or discrete, or both) is indicated at a time. Such a display is derived from multiple inputs; *Indication with memory.* An indication function with the additional capability of storing single or multiple changes of status that occur between scans. (SUB/PE) C37.1-1994

indication point (railway practice) The point at which the train control or cab signal impulse is transmitted to the locomotive or vehicle apparatus from the roadway element. (EEC/PE) [119]

indication (status) point interfaces Master Station or RTU (or both) element(s) that accept(s) a digital input signal for the function of indication. The input/output elements of a SCADA system provide the physical interface to external devices. It is preferred that a point serve one of the functions described below. In some earlier applications, a Control and Indication (C and I) point has been used to specify a combination control and indication point for a specific device (e.g., circuit breaker). The functions are: *Two-state indication.* Only one of the two possible positions of the supervised device is displayed at one time. Such display may be derived from a single set of contacts. *Tree-state indication* One in which the transitional state or security indication as well as the terminal positions of the supervised device is displayed. Such a display is derived from at least two sets of initiating contacts; *Multistate indication.* Only one of the predefined states (transitional or discrete, or both) is indicated at a time. Such a display is derived from multiple inputs; *Indication with memory* An indication function with the additional capability of storing single or multiple changes of status that occur between scans. (SUB/PE) C37.1-1994

indication with memory *See:* supervisory control functions.

indicator (1) (faulted circuit indicators) That portion of the FCI (faulted circuit indicator) which indicates that fault current has been sensed. (T&D/PE) 495-1986w

(2) (software) A device or variable that can be set to a prescribed state based on the results of a process or the occurrence of a specified condition. For example, a flag or semaphore. (C) 610.12-1990

(3) *See also:* display.

indicator light A light that indicates whether or not a circuit is energized. *See also:* appliance outlet. (IA/APP) [90]

indicators (Class 1E power systems for nuclear power generating stations) Devices that display information to the operator. (PE/NP) 380-1975w, 308-1980s

indicator symbol (logic diagrams) A symbol that identifies the state or level of an input or output of a logic symbol with respect to the logic symbol definition. (GSD) 91-1973s

indicator travel The length of the path described by the indicating means or the tip of the pointer in moving from one end of the scale to the other. *Notes:* 1. The path may be an arc or a straight line. 2. In the case of knife-edge pointers and others extending beyond the scale division marks, the pointer shall be considered as ending at the outer end of the shortest scale division marks. *See also:* moving element. (EEC/EMI) [112]

indicator tube An electron-beam tube in which useful information is conveyed by the variation in cross section of the beam at a luminescent target. (ED) 161-1971w, [45]

indices Plural form of index. (C) 610.5-1990w

indicial admittance The instantaneous response to unit step driving force. *Note:* This is a time function that is not an admittance of the type defined under admittance. *See also:* network analysis. (Std100) 270-1966w

indicial response (process control) The output of a system or element, expressed as a function of time, when forced from initial equilibrium by a unit-step input. *Note:* In the time domain, it is the graphic statement of the characteristic of a system or element analogous to the frequency-response characteristic of the transfer function. (PE/EDPG) [3]

indigenous error A computer program error that has not been purposely inserted as part of an error-seeding process. (C) 610.12-1990

indigenous fault (software) A fault existing in a computer program that has not been inserted as part of a fault seeding process. *See also:* fault seeding; fault; computer program. (C/SE) 729-1983s

indirect-acting machine voltage regulator A machine voltage regulator having a voltage-sensitive element that acts indirectly, through the medium of an interposing device such as contractors or a motor, to control the excitation of an electric machine. *Note:* A regulator is called a generator voltage regulator when it acts in the field circuit of a generator and is called an exciter voltage regulator when it acts in the field circuit of the main exciter. (SWG/PE) C37.100-1992

indirect-acting recording instrument A recording instrument in which the level of measurement energy of the primary detector is raised through intermediate means to actuate the marking device. *Note:* The intermediate means are commonly either mechanical, electric, electronic, or photoelectric. *See also:* instrument. (EEC/PE) [119]

indirect address (1) An address that specifies a storage location containing either a direct address or another indirect address. (C) [20], 610.10-1994w, [85]

(2) (software) An address that identifies the storage location of another address. The designated storage location may contain the address of the desired operand or another indirect address; the chain of addresses eventually leads to the operand. *Synonym:* multilevel address. *Contrast:* direct address; immediate data. *See also:* indirect instruction; *n*−level address. (C) 610.12-1990

indirect addressing An addressing mode in which the address field of an instruction contains an indirect address. *Contrast:* direct addressing. *See also:* n-level address. (C) 610.10-1994w

indirect-arc furnace An arc furnace in which the arc is formed between two or more electrodes. (EEC/PE) [119]

indirect commutation (auxiliary commutation) (circuit properties) (self-commutated converters) A commutation between a principal switching branch and an auxiliary switching branch succeeded by a commutation to the next principal switching branch. Indirect commutation is employed in some types of converters using circuit-commutated thyristors, where the auxiliary branch includes a commutating capacitor(s) to turn off the outgoing principal switch when the auxiliary switch is turned on. *Note:* In some converter circuits, several auxiliary branches may be involved consecutively. (IA/SPC) 936-1987w

indirect component (illuminating engineering) That portion of the luminous flux from a luminaire which arrives at the work-plane after being reflected by room surfaces. (EEC/IE) [126]

indirect-drive machine (elevators) An electric driving machine, the motor of which is connected indirectly to the driving sheave, drum, or shaft by means of a belt or chain through intermediate gears. *See also:* driving machine. (EEC/PE) [119]

indirect ESD event An ESD event taking place between an intruder and a receptor in proximity to equipment that is the victim. (SPD/PE) C62.47-1992r

indirect ESD test A test in which ESD is applied to a coupling plane in the vicinity of the EUT. (EMC) C63.16-1993

indirect instruction A computer instruction that contains indirect addresses for its operands. *Contrast:* direct instruction; immediate instruction. *See also:* effective instruction; absolute instruction. (C) 610.12-1990, 610.10-1994w

indirect lighting (illuminating engineering) Lighting involving luminaires which distribute 90% to 100% of the emitted light upward. (EEC/IE) [126]

indirectly controlled variable (control) (automatic control) A variable that is not directly measured for control but that is related to, and influenced by, the directly controlled variable. *See also:* feedback control system. (IA/ICTL/IAC) [60]

indirectly heated cathode (unipotential cathode) (equipotential cathode) A hot cathode to which heat is supplied by an independent heater. *See also:* electrode. (ED) 161-1971w

indirect manual operation (of a switching device) Operation by hand through an operating handle mounted at a distance from, and connected to the switching device by, mechanical linkage. (SWG/PE) C37.100-1992

indirect operation (of a switching device) Operating by means of an operating mechanism connected to the main operating shaft or an extension of it, through offset linkages and bearings. (SWG/PE) C37.100-1992

indirect release (trip) (of a switching device) A release energized by the current in the main circuit through a current transformer, shunt, or other transducing device. (SWG/PE) C37.100-1992

indirect stroke (surge arresters) A lightning stroke that does not directly strike any part of a network but induces an overvoltage in it. (PE/T&D) 1410-1997, [84], [8]

indirect-stroke protection (lightning) Lightning protection designed to protect a network or electric installation against indirect strokes. *See also:* direct-stroke protection. (T&D/PE) [10]

individual address (1) An address that identifies a single source or destination service access point. (LM/C) 8802-6-1994

(2) (local area networks) The unique address identifying an individual end node. (C) 8802-12-1998

individual branch circuit A branch circuit that supplies only one utilization equipment. (NESC/NEC) [86]

individual capacitor fuse A fuse applied to disconnect an individual faulted capacitor from its bank. *Synonyms:* individual capacitor fuse; capacitor fusepower systems relaying. (SWG/PE/T&D) C37.40b-1996, 1036-1992, C37.99-2000

individual-equipment test requirements The set of explicit requirements specifying the test conditions, instrumentation, equipment under test (EUT) operation, etc, to be used in testing a specific EUT for conducted and radiated radio noise. Such requirements should take precedence over the requirements of this standard. (EMC) C63.4-1988s

individual-lamp autotransformer (power and distribution transformers) A series autotransformer that transforms the primary current to a higher or lower current as required for the operation of an individual street light. (PE/TR) C57.12.80-1978r

individual-lamp insulating transformer (power and distribution transformers) An insulating transformer used to protect the secondary circuit, casing, lamp, and associated luminaire of an individual street light from the high-voltage hazard of the primary circuit. *See also:* specialty transformer. (PE/TR) C57.12.80-1978r, [57]

individual line (1) (telephone switching systems) A line arranged to serve one main station. (COM) 312-1977w

(2) (data transmission) A subscriber line arranged to serve only one main station although additional stations may be connected to the line as extensions. An individual line is not arranged for discriminatory ringing with respect to the stations on that line. (PE) 599-1985w

individual line downtime (switching system) The time during which the customer is out of service as a result of system failures. This does not include the time out of service due to congestion, unless the congestion is due to a switching system failure. *See also:* out of service. (COM/TA) 973-1990w

individual pole operation (of a multiple circuit breaker or switching device) A descriptive term indicating that any pole(s) of the device can be caused to change state (open or close) without changing the state of the remaining pole(s). Devices may have capability for individual pole opening, individual pole closing, or both. (SWG/PE) C37.100-1992

individual trunk (telephone switching systems) A trunk, link, or junctor that serves only one input group of a grading. (COM) 312-1977w

Individual Virtual Port A Subgroup Port that represents the capability for communication with one other Remote Bridge in the Remote Bridge Group to which the Port attaches. *Note:* An Individual Virtual Port always has another Individual Virtual Port as its peer Port; the two Ports connect their respective Remote Bridges in a two-member Subgroup. (C/LM) 802.1G-1996

indivisible access A data access for which the entire datum is read or written as a whole, with no possibility of partial interleaved access by another processor. (C/MM) 1596.5-1993

indivisible-access cycle A DTB cycle that is used to access slave locations indivisibly and without permitting any other master to access these locations until the operation is complete. (C/MM) 1096-1988w

indoor (1) Not suitable for exposure to the weather. *Note:* For example, an indoor capacitor unit is designed for indoor service or for use in a weatherproof housing. *See also:* outdoor. (T&D/PE/TR) 18-1992, C57.12.80-1978r

(2) Designed for use inside buildings or weatherproof (weather-resistant) enclosures. *Note:* Because of the wide variety of enclosures available, when a fuse that is designed for indoor application is installed inside an outdoor enclosure, such installations should be verified with the fuse manufacturer. (SWG/PE) C37.40-1993

(3) Designed for use only inside buildings, or weather-resistant enclosures. (SWG/PE) C37.100-1992

indoor arrester An arrester that, because of its construction, must be protected from the weather. (SPD/PE) C62.11-1999

indoor bushing A bushing in which both ends are in ambient air but are not exposed to external atmospheric conditions. *Note:* An outdoor bushing may be used indoors but an indoor bushing may not be used outdoors. (PE/TR) C57.19.03-1996

indoor current transformer One that, because of its construction, must be protected from the weather. (PE/TR) C57.13-1993

indoor enclosure (power system communication equipment) An enclosure for use where another housing provides protection against exposure to the weather. (PE/PSC) 281-1984w

indoor-immersed bushing A bushing in which one end is in ambient air but not exposed to external atmospheric conditions and the other end is immersed in an insulating medium such as oil or gas. (PE/TR) C57.19.03-1996

indoor reactor A reactor that, because of its construction, must be protected from the weather. (PE/TR) C57.16-1996

indoor regulator A regulator that, because of its construction, must be protected from the weather. (PE/TR) C57.15-1999

indoor shunt reactor (shunt reactors over 500 kVA) One which, because of its construction, must be protected from the weather. (PE/TR) C57.21-1981s

indoor surge-protective device A surge-protective device that, because of its construction, shall be protected from the weather. (SPD/PE) C62.62-2000

indoor termination A termination intended for use where it is protected from direct exposure to both solar radiation and precipitation. Terminations designed for use in sealed enclosures where the external dielectric strength is dependent upon liquid or special gaseous dielectrics are also included in this category. (PE/IC) 48-1990s

indoor termination—dry A termination intended for use where it is protected from solar radiation and precipitation and not subject to periodic condensation, or other excessive humidity (90% RH or more). May be installed in air conditioned or heated areas. (PE/IC) 48-1996

indoor termination—wet A termination intended for use where it is protected from direct exposure to both solar radiation and precipitation, but is subjected to climatic conditions that can cause condensation onto the termination surfaces. (PE/IC) 48-1996

indoor transformer (power and distribution transformers) A transformer which, because of its construction, must be protected from the weather. (PE/TR) C57.12.80-1978r

indoor wall bushing A wall bushing, of which both ends are suitable for operating only where protection from the weather is provided. *See also:* bushing. 49-1948w

induced charge The charge that flows when the condition of the device is changed from that of zero applied voltage (after having previously been saturated with either a positive or negative voltage) to at least that voltage necessary to saturate in the same sense. *Note:* The induced charge is dependent on the magnitude of the applied voltage, which should be specified in describing this characteristic of ferroelectric devices. *See also:* ferroelectric domain. (UFFC) 180w

induced control voltage (Hall effect devices) The electromotive force induced in the loop formed by the control current leads and the current path through the Hall plate by a varying magnetic flux density, when there is no control current. (MAG) 296-1969w

induced current (1) (general) Current in a conductor due to the application of a time-varying electromagnetic field. *See also:* induction heating. (IA) 54-1955w

(2) (interference terminology) The interference current flowing in a signal path as a result of coupling of the signal path with an interference field, that is, a field produced by an interference source. *See also:* interference. (IE) [43]

(3) (lightning strokes) The current induced in a network or electric installation by an indirect stroke. *See also:* direct-stroke protection. (T&D/PE) [10]

induced electrification The separation of charges of opposite sign onto parts of a conductor as a result of the proximity of charges on other objects. *Note:* The charge on a portion of such a conductor is often called an induced charge or a bound charge. (Std100) 270-1966w

induced emission *See:* stimulated emission.

induced field current (synchronous machines) The current that will circulate in the field winding (assuming the circuit is closed) due to transformer action when an alternating voltage is applied to the armature winding, for example, during starting of a synchronous motor. (PE) [9]

induced-potential tests (electric power) Dielectric tests in which the test voltages are suitable-frequency alternating voltages, applied or induced between the terminals. (PE/SPD) 32-1972r

induced voltage (1) (general) A voltage produced around a closed path or circuit by a change in magnetic flux linking that path. *Notes:* 1. Sometimes more narrowly interpreted as a voltage produced around a closed path or circuit by a time rate of change in magnetic flux linking that path when there is no relative motion between the path or circuit and the magnetic flux. 2. A single-phase stator winding energized with alternating current, produces a pulsating magnetic field which causes a voltage to be induced in a blocked rotor circuit, and the same magnetic field may be interpreted in terms of two magnetic fields of constant amplitude traveling in opposite directions around the air gap, causing two voltages to be generated in a blocked rotor circuit. 3. Whether a voltage is defined as being induced or generated is often simply a matter of point of view. *See also:* induction motor; generated voltage; Faraday's law. (PE) [9]

(2) (lightning strokes) The voltage induced on a network or electric installation by an indirect stroke. *See also:* direct-stroke protection. (T&D/PE) [10], 1410-1997

(3) (corona measurement) Voltage that is induced in a winding. Induced voltage also includes voltage applied across a winding. (MAG/ET) 436-1977s

induced voltage tests (power and distribution transformers) Induced voltage tests are dielectric tests on transformer windings in which the appropriate test voltages are developed in the windings by magnetic induction. *Note:* Power for induced voltage tests is usually supplied at higher-than-rated frequency to avoid core saturation and excessive excitation current. (PE/TR) C57.12.80-1978r

inducing current The current that flows in a single conductor of an electric supply line with ground return to give the same value of induced voltage in a telecommunication line (at a particular separation) as the vectorial sum of all voltages induced by the various currents in the inductive exposure as a result of ground fault. (PE/PSC) 367-1996

inductance (1) The property of an electric circuit by virtue of which a varying current induces an electromotive force in that circuit or in a neighboring circuit. (CHM) [51]

(2) A force that resists the sudden buildup of electric current. *Note:* Inductance can cause errors during transmission. (C) 610.7-1995

inductance coil *See:* inductor.

inductance coupling (interference terminology) The type of coupling in which the mechanism is mutual inductance between the interference is induced in the signal system by a magnetic field produced by the interference source. *See also:* interference. (IE) [43]

inductance, effective *See:* effective inductance.

inductance grounded (system grounding) Grounded through impedance, the principal element of which is inductance. *Note:* The conditions of an inductance-grounded system are that X_0/X_1 lie within the range of $3-10$ and $R_0/X_0 \leq 1$. The ground-fault current becomes 25% or more of the three-phase fault current. Inductance grounding becomes "effective grounding" if X_0/X_1 is reduced to 3 or less. (IA/PSE) 142-1982s

induction (A) The process of generating time-varying voltages and/or currents in conductive objects or electric circuits by the influence of the time-varying electric, magnetic, or electromagnetic fields. **(B) (coupling)** The process of generating time-varying voltages and/or currents in otherwise unenergized conductive objects or electric circuits by the influence of the time-varying electric and/or magnetic fields. (T&D/PE) 539-1990, 1048-1990

induction coil (A) A transformer used in a telephone set for interconnecting the transmitter, receiver, and line terminals. **(B)** A transformer for converting interrupted direct current into high-voltage alternating current. *See also:* telephone station. (PE/EM) 43-1974

induction compass A device that indicates an aircraft's heading, in azimuth. Its indications depend on the current generated in a coil revolving in the earth's magnetic field. (EEC/PE) [119]

induction-conduction heater A heating device in which electric current is conducted through but is restricted by induction to a preferred path in a charge. *See also:* induction heating. (IA) 54-1955w

induction coupling (electric coupling) An electric coupling in which torque is transmitted by the interaction of the magnetic field produced by magnetic poles on one rotating member and induced currents in the other rotating member. *Note:* The magnetic poles may be produced by direct current excitation, permanent magnet excitation, or alternating current excitation. The induced currents may be carried in a wound armature or squirrel cage, or may appear as eddy currents. (PE/EM) 290-1980w, [9]

induction cup (of a relay) A form of relay armature in the shape of a cylinder with a closed end that develops operating torque by its location within the fields of electromagnets that are excited by the input quantities. (SWG/PE/PSR) C37.100-1992, C37.90-1978s

induction cylinder (of a relay) A form of relay armature in the shape of an open-ended cylinder that develops operating torque by its location within the fields of electromagnets that are excited by the input quantities. (SWG/PE/PSR) C37.100-1992, C37.90-1978s

induction disk (1) (of a relay) A form of relay armature in the shape of a disk that usually serves the combined function of providing an operating torque by its location within the fields of an electromagnet excited by the input quantities and a restraining force by motion within the field of a permanent magnet. (SWG/PE/PSR) C37.100-1992, C37.90-1978s **(2) (utility consumer interconnections)** A thin circular (or spiraled) disk of nonmagnetic conducting material in which eddy currents are produced to create torque about an axis of rotation. (PE/PSR) C37.95-1973s

induction, electrostatic *See:* electrostatic induction.

induction factor (magnetic core testing) Under stated conditions, the self inductance that a coil of specified shape and dimensions placed on the core in a given position should have, if it consisted of one turn.

$$A_L = \frac{L}{N^2}$$

A_L = Induction factor (henrys/turns^2), L = Self inductance of the coil on the core, in henrys, N = Number of turns of the coil. (MAG) 393-1977s

induction frequency converter A wound-rotor induction machine in which the frequency conversion is obtained by induction between a primary winding and a secondary winding rotating with respect to each other. *Notes:* 1. The secondary winding delivers power at a frequency proportional to the relative speed of the primary magnetic field and the secondary member. 2. In case the machine is separately driven, this relative speed is maintained by an external source of mechanical power. 3. In case the machine is self-driven, this relative speed is maintained by motor action within the machine obtained by means of additional primary and secondary windings with number of poles differing from the number of poles of the frequency-conversion windings. In special cases one secondary winding performs the function of two windings, being short-circuited with respect to the poles of the driving primary winding and open-circuited with respect to the poles of the primary-conversion winding. *See also:* converter. (PE) [9]

induction furnace A transformer of electric energy to heat by electromagnetic induction. (EEC/PE) [119]

induction generator (1) (A) (rotating machinery) An induction machine, when driven above synchronous speed by an external source of mechanical power, used to convert mechanical power to electric power. *See also:* asynchronous machine. **(B)** A generator that produces power with rotor speeds slightly higher than synchronous speed. It does not have the rotor field excitation requirement of synchronous generators. (PE/EDPG) [9], 1020-1988

(2) An induction machine driven above synchronous speed by an external source of mechanical power. (IA/MT) 45-1998

induction heater (interference terminology) A device for causing electric current to flow in a charge of material to be heated. Types of induction heaters can be classified on the basis of frequency of the induced current, for example, a low-frequency induction heater usually induces power-frequency current in the charge: a medium-frequency induction heater induces currents of frequencies between 180 and 540 hertz: a high-frequency induction heater induces currents having frequencies from 1000 hertz upward. (PE/PSR) [6]

induction heating (electrical heating systems) The generation of heat in any conducting material by means of magnetic flux-induced currents. (IA/PC) 844-1991

induction instrument An instrument that depends for its operation on the reaction between a magnetic flux (or fluxes) set up by one or more currents in fixed windings and electric currents set up by electromagnetic induction in movable conducting parts. *See also:* instrument. (EEC/PE) [119]

induction loop (of a relay) A form of relay armature consisting of a single turn or loop that develops operating torque by its location within the fields of electromagnets that are excited by the input quantities. (SWG/PE/PSR) C37.100-1992, C37.90-1978s

induction loudspeaker A loudspeaker in which the current that reacts with the steady magnetic field is induced in the moving member. (SP) [32]

induction machine An asynchronous ac machine that comprises a magnetic circuit interlinked with two electric circuits, or sets of circuits, rotating with respect to each other and in which power is transferred from one circuit to another by electromagnetic induction. Examples of induction machines are induction generators, induction motors, and certain types of frequency converters and phase converters. (IA/MT) 45-1998

induction motor A polyphase ac motor in which the secondary field current is created solely by induction. The motor operates at less than synchronous speed and less than unity power factor. The operating speed is dependent on the frequency of the power source. It is generally the motor of choice for auxiliary drives. (IA/MT) 45-1998

induction-motor meter A motor-type meter in which the rotor moves under the reaction between the currents induced in it and a magnetic field. *See also:* electricity meter. (ELM) C12.1-1982s

induction regulator (electrical heating applications to melting furnaces and forehearths in the glass industry) A regulating transformer, having a primary winding in shunt and a secondary winding in series with a circuit for gradually adjusting the voltage, phase relation, or both, of the circuit by changing the relative magnetic coupling of the existing (primary) and series (secondary) windings. (IA) 668-1987w

induction ring heater A form of core-type induction heater adapted principally for heating electrically conducting charges of ring or loop form, the core being open or separable to facilitate linking the charge. *See also:* induction heater. (IA) 54-1955w, 169-1955w

induction vibrator A device momentarily connected between the airplane direct-current supply and the primary winding of the magneto, thus converting the magneto to an induction coil. *Note:* It provides energy to the spark plugs of an aircraft engine during its starting period. (EEC/PE) [119]

induction voltage regulator (power and distribution transformers) A regulating transformer having a primary winding in shunt and a secondary winding in series with a circuit, for gradually adjusting the voltage or the phase relation, or both, of the circuit by changing the relative magnetic coupling of the exciting (primary) and series (secondary) windings. (PE/TR) C57.12.80-1978r

induction watthour meter A motor-type meter in which currents induced in the rotor interact with a magnetic field to produce the driving torque. (ELM) C12.1-1982s

induction zone (of EMI) The area where the distance to the source of electromagnetic interference is less than the wavelength of the interference. In the induction zone the circuit or system will be affected by transverse or longitudinal fields. *Contrast:* radiation zone. (PE/IC) 1143-1994r

inductive assertion method (software) A proof of correctness technique in which assertions are written describing program inputs, outputs, and intermediate conditions, a set of theorems is developed relating satisfaction of the input assertions to satisfaction of the output assertions, and the theorems are proved or disproved using proof by induction. (C) 610.12-1990

inductive coordination (electric supply and communication systems) The location, design, construction, operation, and maintenance in conformity with harmoniously adjusted methods that will prevent inductive interference. (EEC/PE) [119]

inductive coupling (ground system) (1) (communication circuits) The association of two or more circuits with one another by means of inductance mutual to the circuits or the mutual inductance that associates the circuits. *Note:* This term, when used without modifying words, is commonly used for coupling by means of mutual inductance, whereas coupling by means of self-inductance common to the circuits is called direct inductive coupling.

(2) (inductive coordination practice) The interrelation of neighboring electric supply and communication circuits by electric or magnetic induction, or both. (PE/PSIM) 81-1983

inductive exposure A situation of proximity between electric supply and communication circuits under such conditions that inductive interference must be considered. *See also:* inductive coordination. (EEC/PE) [119]

inductive gap (microwave receiver protectors) (nonlinear, active, and nonreciprocal waveguide components) In cell-type waveguide receiver protectors, this is the slot width or distance between iris plates. *See also:* resonant gap. (MTT) 457-1982w

inductive influence (electric supply circuit with its associated apparatus) Those characteristics that determine the character and the intensity of the inductive field that it produces. Inductive influence is a measure of the interfering effect of the power system. (COM/TA) 469-1988w

inductive interference (electric supply and communication systems) An effect, arising from the characteristics and inductive relations of electric supply and communication systems, of such character and magnitude as would prevent the communication circuits from rendering service satisfactorily and economically if methods of inductive coordination were not applied. *See also:* inductive coordination. (EEC/PE) [119]

inductively coupled circuit A coupled circuit in which the common element is mutual inductance. *See also:* network analysis. (Std100) 270-1966w

inductive microphone *See:* inductor microphone.

inductive neutralization (coil neutralization) (shunt neutralization) A method of neutralizing an amplifier whereby the feedback susceptance due to an interelement capacitance is canceled by the equal and opposite susceptance of an inductor. *See also:* amplifier; feedback. (AP/ANT) 145-1983s

inductive residual voltage (Hall effect devices) The electromotive force induced in the loop formed by the Hall voltage leads and the conductive path through the Hall plate by a varying magnetic flux density, when there is no control current. (MAG) 296-1969w

inductive susceptiveness (communication circuits) Those characteristics that determine, so far as such characteristics are able to determine, the extent to which the service rendered by the circuit can be adversely affected by a given inductive field. *See also:* inductive coordination. (PE/EEC) [119]

inductor (1) (general) A device consisting of one or more associated windings, with or without a magnetic core, for introducing inductance into an electric circuit.

(2) (railway practice) A roadway element consisting of a mass of iron with or without a winding, that acts inductively on the vehicle apparatus of the train control, train stop, or cab signal system. (PE/EM) 43-1974s

inductor alternator An inductor machine for use as a generator, the voltage being produced by a variation of flux linking the armature winding without relative displacement of field magnet or winding and armature winding. (PE) [9]

inductor, charging *See:* charging inductor.

inductor circuit (railway practice) A circuit including the inductor coil and the two lead wires leading therefrom taken through roadway signal apparatus as required. (EEC/PE) [119]

inductor dynamotor (rotating machinery) A dynamotor inverter having toothed field poles and an associated stationary secondary winding for conversion of direct current to high-frequency alternating current by inductor-generator action. (PE) [9]

inductor frequency-converter (rotating machinery) An inductor machine having a stationary input alternating-current winding, which supplies the excitation, and a stationary output winding of a different number of poles in which the output frequency is induced through change in field reluctance by means of a toothed rotor. *Note:* If the machine is separately driven, the rotor speed is maintained by an external source of mechanical power. If the machine is self-driven, the primary winding and rotor function as in a squirrel-cage induction motor or a reluctance motor. (PE) [9]

inductor machine (rotating machine) A synchronous machine in which one member, usually stationary, carries main and exciting windings effectively disposed relative to each other, and in which the other member, usually rotating, is without windings but carries a number of regular projections. (Per-

manent magnets may be used instead of the exciting winding). (PE) [9]

inductor microphone (inductive microphone) A moving-conductor microphone in which the moving element is in the form of a straight-line conductor. *See also:* microphone. (EEC/PE) [119]

inductor type synchronous generator A generator in which the field coils are fixed in magnetic position relative to the armature conductors. The electromotive forces are produced by the movement of masses of magnetic material. (IA/MT) 45-1998

inductor-type synchronous motor An inductor machine for use as a motor, the torques being produced by forces between armature magnetomotive force and salient rotor teeth. *Note:* Such motors usually have permanent-magnet field excitation, are built in fractional-horsepower ratings, frames and operate at low speeds, 300 revolutions per minute or less. (PE) [9]

industrial brush (rotating machinery) A brush having a cross-sectional area (width × thickness) of more than 1.4 square inch or a length of more than 1 1.2 inches, but larger than a fractional-horsepower brush. *See also:* brush. (PE) [9]

industrial control Broadly, the methods and means of governing the performance of an electric device, apparatus, equipment, or system used in industry. (IA/IAC) [60]

industrial electric locomotive An electric locomotive, used for industrial purposes, that does not necessarily conform to government safety regulations as applied to railroads. *Note:* This term is generally applied to locomotives operating in surface transportation and does not include mining locomotives. A prefix diesel-electric, gas-electric, etc., may replace the word electric. *See also:* electric locomotive. (EEC/PE) [119]

industrial process supervisory system A supervisory system that initiates signal transmission automatically upon the occurrence of an abnormal or hazardous condition in the elements supervised, which include heating, air-conditioning, and ventilating systems, and machinery associated with industrial processes. *See also:* protective signaling. (EEC/PE) [119]

industrial zone A zone that includes manufacturing plants where fabrication or original manufacturing is done, as defined by local ordinances. (PE/SUB) 1127-1998

ineffective attempts A switch-related ineffective attempt within a stored program control switching system (SPCS) is any valid bid for service that is not connected to the correct termination as defined by the received digits and busy/idle state of the equipment. A valid bid for service is an originating or incoming call attempt for which the switching system receives the expected number of digits. In any switching system, some ineffective attempts must naturally exist because of competition for shared resources. Other ineffective attempts may occur because equipment that normally performs a call setup function is malfunctioning (this includes impaired digital signals in a time-division system), operating at reduced capacity, or failing totally. Failures of hardware or software or errors in procedural or office data may cause such equipment problems. The ineffective attempt rate, as defined, applies for all causes, including congestion. (COM/TA) 973-1990w

ineffective machine attempts Any valid bid for service that does not complete due to a switch failure. The failure can be due to hardware, software, or errors in procedure or office data. A valid bid for service is defined as any originating or incoming call attempt for which the expected number of digits are delivered to the switching system. Misdialings or incomplete dialings caused by customers are not included in this definition. Calls that cannot be completed due to traffic congestion are also not included in this definition unless the congestion is caused by a system or subsystem fault or error. (COM/TA) 973-1990w

inequality relation A VHDL relational expression in which the relational operator is /=. (C/DA) 1076.3-1997

inequivalence *See:* exclusive OR.

inertance (automatic control) A property expressible by the quotient of a potential difference (temperature, sound pressure, liquid level) divided by the related rate of change of flow: the thermal or fluid equivalent of electrical inductance or mechanical moment of inertia. *See also:* feedback control system. (PE/EDPG) [3]

inert gas-pressure system (power and distribution transformers) A system in which the interior of the tank is sealed from the atmosphere, over the temperature range specified, by means of a positive pressure of inert gas maintained from a separate inert gas source and reducing valve system. (PE/TR) C57.12.80-1978r

inertia compensation The effect of a control function during acceleration or deceleration to cause a change in motor torque to compensate for the driven-load inertia. *See also:* feedback control system. (IA/ICTL/IAC/APP) [60], [75]

inertia constant (machine) The energy stored in the rotor when operating at rated speed expressed as kilowatt-seconds per kilovolt-ampere rating of the machine. *Note:* The inertia constant is

$$h = \frac{0.231 \times WK^2 \times n^2 \times 10^{-6}}{\text{kVA}}$$

where h = inertia constant in kilowatt-seconds per kilovolt-ampere, Wk^2 = moment of inertia in pound-feet^2, n = speed in revolutions per minute, kVA = rating of machine in kilovolt-amperes. *See also:* asynchronous machine. (PE) [9]

inertialess scanning *See:* electronic scanning.

inertial navigation equipment A type of dead-reckoning navigation equipment whose operation is based upon the measurement of accelerations: accelerations are sensed dynamically by devices stabilized with respect to inertial space, and the navigational quantities (such as vehicle velocity, angular orientation, or positional information) are determined by computers and/or other instrumentation. *See also:* navigation. (AES/RS) 686-1982s, [42]

inertial navigator A self-contained, dead-reckoning navigation aid using inertial sensors, a reference direction, and initial or subsequent fixes to determine direction, distance, and speed; single integration of acceleration provides speed information and a double integration provides distance information. *See also:* navigation. (AES/RS) 686-1982s, [42]

inertial sensor A position, attitude, or motion sensor whose references are completely internal, except possibly for initialization. (AES/GYAC) 528-1994

inertial space (navigation) A frame of reference defined with respect to the fixed stars. *See also:* navigation. (AES/RS) 686-1982s, [42]

inertia relay A relay with added weights or other modifications that increase its moment of inertia in order either to slow it or to cause it to continue in motion after the energizing force ends. *See also:* relay. (EEC/REE) [87]

infant mortality The set of failures that occur during the early-failure period of a system or component. (C) 610.12-1990

infant mortality failures (station control and data acquisition) A characteristic pattern of failure wherein the number of failures per unit of time decreases rapidly as the number of operating hours increase. (SUB/PE) C37.1-1994

infeed A source of fault current between a relay location and a fault location. (PE/PSR) C37.113-1999

inference engine A software engine within an expert system that draws conclusions from rules and situational facts. *See also:* parallel inference machine. (C) 610.10-1994w

infiltration Leakage of outside air into a building. (IA/PSE) 241-1990r

infinite multiplication factor (power operations) The ratio of the average number of neutrons produced in each generation of nuclear fissions to the average number of corresponding neutrons absorbed. Since neutron leakage out of the system is ignored, k is the effective multiplication factor for an infinitely large assembly. (PE/PSE) 858-1987s

infix notation (mathematics of computing) A method of forming mathematical expressions in which each operator is written between its operands and the expression is interpreted subject to rules of operator precedence and grouping symbols. For example, A added to B and the result multiplied by C is represented as $(A + B) \cdot C$. *Contrast:* postfix notation. (C) 1084-1986w

inflection point (tunnel-diode characteristic) The point on the forward current-voltage characteristic at which the slope of the characteristic reaches its most negative value. *See also:* peak point. (ED) 253-1963w, [46]

inflection-point current (tunnel-diode characteristic) The current at the inflection point. *See also:* peak point. (ED) 253-1963w, [46]

inflection-point emission current (electron tube) That value of current on the diode characteristic for which the second derivative of the current with respect to the voltage is zero. *Note:* This current corresponds to the inflection point of the diode characteristic and is, under suitable conditions, an approximate measure of the maximum space-charge-limited emission current. (ED) 161-1971w

inflection-point voltage (tunnel-diode characteristic) The voltage at which the inflection point occurs. *See also:* peak point. (ED) 253-1963w, [46]

influence (1) (specified variable or condition) (upon an instrument) The change in the indication of the instrument caused solely by a departure of the specified variable or condition from its reference value, all other variables being held constant. (EEC/AII) [102]
(2) (upon a recording instrument) The change in the recorded value caused solely by a departure of the specified variable or condition from its reference value, all other variables being held constant. *Note:* If the influences in any direction from reference conditions are not equal, the greater value applies. (EEC/ERI) [111]

influence quantity A radiation field, electromechanical condition, or environmental condition that may provoke a response. (NI) N42.17B-1989r

INFO file For each product and fileset, the file within an exported catalog containing the metadata describing the software_file objects and attributes. (C/PA) 1387.2-1995

informal testing Testing conducted in accordance with test plans and procedures that have not been reviewed and approved by a customer, user, or designated level of management. *Contrast:* formal testing. (C) 610.12-1990

informatics *See:* information science.

information (1) (general) The meaning assigned to data by known conventions. (C) [20], [85]
(2) (nuclear power generating station) Data describing the status and performance of the plant. (PE/NP) 566-1977w
(3) (data management) The meaning that humans assign to data by means of known conventions that are applied to the data. *See also:* narrative information; information traffic; formatted information. (C) 610.2-1987, 610.5-1990w

information access service (IAS) A component of infrared link management protocol (IrLMP). (EMB/MIB) 1073.3.2-2000

information center (IC) (A) A user-oriented computer system that provides non-technical users direct access to data and software for information processing tasks such as report generation, data modeling and manipulation, and word processing. *Synonym:* information resource center. *See also:* decision support services. **(B)** Support personnel for a computer system as in definition (A). (C) 610.2-1987

information content (message or a symbol from a source) The negative of the logarithm of the probability that this particular message or symbol will be emitted by the source. *Notes:* 1. The choice of logarithmic base determines the unit of information content. 2. The probability of a given message or symbol's being emitted may depend on one or more preceding messages or symbols. 3. The quantity has been called self-information. *See also:* information theory; hartley; bit. (Std100) 171-1958w

information display channel (accident monitoring instrumentation) An arrangement of electrical and mechanical components or modules, or both, from measured process variable to display device as required to sense and display conditions within the generating stations. (PE/NP) 497-1981w

information display channel failure (accident monitoring instrumentation) A situation where the display disagrees, in a substantive manner, (that is, the maximum error within which the information must be conveyed to the operator has been exceeded), with the conditions or status of the plant. (PE/NP) 497-1981w

information efficiency The efficiency with which information is handled by an organization. *See also:* information traffic. (C) 610.2-1987

information field The sequence of octets occurring between the control field and the end of the LLC PDU. The information field contents of I, TEST, and UI PDUs are not interpreted at the LLC sublayer. (C/LM/CC) 8802-2-1998

information graphics The use of a computer to produce low quality, low cost graphical output for peer group presentations. *Synonym:* peer graphics. *Contrast:* presentation graphics. (C) 610.2-1987

information hiding (software) A software development technique in which each module's interfaces reveal as little as possible about the module's inner workings and other modules are prevented from using information about the module that is not in the module's interface specification. *See also:* encapsulation. (C) 610.12-1990

information interchange The process of sending and receiving data in such a manner that the information content or meaning associated with the data is not altered during the transmission. *See also:* data interchange. (C) 610.5-1990w

information, mutual *See:* mutual information.

information object A well-defined piece of information, definition, or specification that requires a name to identify its use in an instance of communication. (C/LM) 802.10g-1995

information overload A condition resulting from presentation of too much data to be assimilated and acted upon without further organization. *See also:* exception reporting. (C) 610.2-1987

information processing *See:* data processing.

Information Processing Language (IPL) A high-order language used for performing list processing. (C) 610.13-1993w

information processing system *See:* information system.

information resource center (IRC) *See:* information center.

information retrieval The techniques used to recover information from an organized body of knowledge. *See also:* information storage. (C) 610.5-1990w

information science A branch of technology concerned with the way in which data are processed and transmitted through digital equipment. (C) 610.2-1987

information separator (IS) Any control character used to delimit like units of data in a hierarchical arrangement of data. The name of the separator does not necessarily indicate the units of data that it separates. *Synonym:* separating character. (C) 610.5-1990w

information services interface (ISI) The boundary across which external, persistent storage service is provided. (C/PA) 14252-1996

information source *See:* message source.

information storage The theory and techniques for the organization, storage, and searching of an organized body of knowledge. *Note:* Generally refers to a large body of data. *See also:* information system; information retrieval. (C) 610.5-1990w

information storage and retrieval *See:* information retrieval; information storage.

information storage and retrieval system *See:* information system.

information system (1) A mechanism used for acquiring, filing, storing, and retrieving an organized body of knowledge. *Synonym:* information storage and retrieval system. *See also:* information storage and retrieval. (C) 610.5-1990w, 610.10-1994w

(2) A data processing system integrated with such other processes as office automation and data communication. *Synonym:* information processing system. *See also:* data processing system. (C) 610.10-1994w

information systems service A high-level description of the services used to support a BSR. IS Services are cross-referenced to the BSRs they support, the IT Services that deliver them, and the technology components that house them. (C/PA) 1003.23-1998

information technology center *See:* information center.

information technology equipment Unintentional radiator equipment designed for one or more of the following purposes:

- Receiving data from an external source (such as a data input line or via a keyboard)
- Performing some processing functions of the received data (such as computation, data transformation or recording, filing, sorting, storage, transfer of data)
- Providing a data output (either to other equipment or by the reproduction of data or images).

Note: This definition includes electrical/electronic units or systems that predominantly generate a multiplicity of periodic binary pulsed electrical/electronic waveforms and are designed to perform data processing functions such as word processing, electronic computation, data transformation, recording, filing, sorting, storage, retrieval and transfer, and reproduction of data as images. (EMC) C63.4-1991

information technology service The most atomic level of technology. A group of IT services will interoperate to deliver an IS service in support of a BSR. IT services are described in terms of protocols, APIs, and service components. *See also:* application program interface. (C/PA) 1003.23-1998

information technology service model A textual and graphical representation of an IT service where all the low-level service components and interfaces are identified. (C/PA) 1003.23-1998

information theory (A) In the narrowest sense, is used to describe a body of work, largely about communciation problems but not entirely about electrical communication, in which the information measures are central. **(B)** In a broader sense it is taken to include all statistical aspects of communication problems, including the theory of noise, statistical decision theory as applied to detection problems, and so forth. *Note:* This broader field is sometimes called "statistical communication theory." **(C)** In a still broader sense its use includes theories of measurement and observation that use other measures of information, or none at all, and indeed work on any problem in which information, in one of its colloquial senses, is important. (Std100) [123]

information traffic The flow of information through an organization. Typically included are origination; production, consolidation, and presentation; reproduction; recording and storage; and distribution. *Synonyms:* document traffic; paper traffic. *See also:* document cycle. (C) 610.2-1987

information transfer (data transmission) The final result of data transmission from a data source to a data sink. The information transfer rate may or may not be equal to the transmission modulation rate. (PE) 599-1985w

informative annex An annex in a standard that is for information only and that is not an official part of the standard itself. (C/MM) 1754-1994

infrared (IR) (fiber optics) The region of the electromagnetic spectrum between the long-wavelength extreme of the visible spectrum (about 0.7 μm) and the shortest microwaves (about 1 mm). (Std100) 812-1984w

infrared radiation (A) (illuminating engineering) For practical purposes any radiant energy within the wavelength range 770 to 106 nm (nanometers) is considered infrared energy. *See also:* regions of electromagnetic spectrum. **(B) (laser maser)** Electromagnetic radiation with wavelengths that lie within the range 0.7 μm to 1 mm. (EEC/IE/LEO) [126], 586-1980

infrastructure The infrastructure includes the distribution system medium (DSM), access point (AP), and portal entities. It is also the logical location of distribution and integration service functions of an extended service set (ESS). An infrastructure contains one or more APs and zero or more portals in addition to the distribution system (DS). (C/LM) 8802-11-1999

ingress The process whereby unwanted signals enter the cable system to occupy spectrum that would otherwise remain free of signal energy. (LM/C) 802.7-1989r

inherent availability (IA) A measure of availability for a system operating in an ideal support environment in which schedule maintenance, standby, and logistic time are ignored. (PE/NP) 933-1999

inherent delay angle (thyristor converter) The delay angle that occurs in some connections (for example, 12-pulse connections) in certain operating conditions even where no phase control is applied. (IA/IPC) 444-1973w

inherent error *See:* inherited error.

inherent reliability The potential reliability of an item present in its design. *See also:* reliability. (R) [29]

inherent transient recovery voltage (transient recovery voltage) The TRV (transient recovery voltage) produced by the circuit with no modifying effect of the switching device. *Note:* The magnitude of the TRV for a given circuit and voltage is affected by the degree of current asymmetry. Symmetrical current usually produces the highest TRV magnitudes and is used as the basis for TRV-rated values. An asymmetrical current normally reduces the TRV magnitude from the symmetrical current case. (SWG/PE) C37.04E-1985w, C37.100-1992, C37.100B-1986w, C37.4D-1985w

inheritance (1) Using the same method to implement an operation as the immediate superclass in the class hierarchy. Inheritance greatly simplifies the definition of new object classes and is one of the main reasons for organizing classes into a hierarchy. (C) 1295-1993w

(2) The way in which the attribute definitions of a common object class are used as a part of the definition of other object classes. The definition of the new object class includes the definition of the common class plus the additional definitions specific to the new object class. (C/PA) 1387.2-1995

(3) A semantic notion by which the responsibilities (properties and constraints) of a subclass are considered to include the responsibilities of a superclass, in addition to its own, specifically declared responsibilities. (C/SE) 1320.2-1998

inherited attribute (A) An attribute that is a characteristic of a class by virtue of being an attribute of a generic ancestor. **(B)** An attribute that is a characteristic of a category entity by virtue of being an attribute in its generic entity or a generic ancestor entity. (C/SE) 1320.2-1998

inherited error (1) (mathematics of computing) An error that is input to a given operation, either from a previous operation or from the initial condition of a variable. *Synonym:* inherent error. *Contrast:* propagated error. (C) 1084-1986w

(2) (software) An error carried forward from a previous step in a sequential process. (C) 610.12-1990

inhibit (supervisory control, data acquisition, and automatic control) (station control and data acquisition) To prevent a specific event from occurring (e.g., alarm inhibit). (SWG/PE/SUB) C37.100-1992, C37.1-1994

inhibited bystander An inhibited bystander is a potential master that has no current need to acquire the bus and is fairness inhibited. (C/MM) 896.1-1987s

inhibited oil (power and distribution transformers) Mineral transformer oil to which a synthetic oxidation inhibitor has been added. (PE/TR) C57.12.80-1978r

inhibitor (insulating oil) Any substance that when added to an electrical insulating fluid retards or prevents undesirable reactions. (PE/TR) 637-1985r

inhomogeneous dense medium A medium having discrete or continuous spatial variations in its permittivity or permeability, such that multiple scattering must be considered. *See also:* sparse medium. (AP/PROP) 211-1997

inhomogeneous line-broadening (laser maser) An increase of the width of an absorption or emission line, beyond the natural linewidth, produced by a disturbance (for example, strain, imperfections, etc.) which is not the same for all of the source emitters. (LEO) 586-1980w

inhomogeneous medium A medium whose properties are not spatially invariant. (AP/PROP) 211-1997

inhomogeneous plane wave A wave for which the planes of constant magnitude and planes of constant phase are not parallel. Sometimes called a heterogeneous plane wave, but this use is deprecated. (AP/PROP) 211-1997

in-house system *See:* in-plant system.

initial condition (1) (analog computer) The value of a variable at the start of computation. A more restricted definition refers solely to the initial value of an integrator. Also used as a synonym for the computer-control state "reset." *See also:* reset. (C) 165-1977w

(2) (modeling and simulation) The values assumed by the variables in a system, model, or simulation at the beginning of some specified duration of time. *Contrast:* boundary condition; final condition. (C) 610.3-1989w

initial contact pressure The force exerted by one contact against the mating contact when the actuating member is in the initial contact-touch position. *Note:* The initial contact pressure is usually measured and expressed in terms of the force that must be exerted on the yielding contact while the actuating member is held in the initial contact-touch position in order to separate the mating contact surface against the action of the spring or other contact pressure device. *See also:* electric controller. (IA/ICTL/IAC) [60]

initial current pulse The subnanosecond risetime, and greater than 1 ns to perhaps 3 ns duration pulses that can occur at the start of the current wave from an ESD. Also called initial pulse, initial spike, and fast discharge mode. Its leading edge is the initial slope. (SPD/PE) C62.47-1992r

initial element *See:* primary detector.

initial erection (gyros) The mode of operation of a vertical gyro in which the gyro is being erected or slaved initially. (AES/GYAC) 528-1994

Initial Graphics Exchange Specification (IGES) (1) A computer graphics standard that provides a method for exchanging geometry and associated data among computer graphics systems, intended for human interpretation. It was publicly developed, and sponsored by the National Institute of Standards and Technology (formerly National Bureau of Standards) then adopted as an American National Standards Institute (ANSI) standard. *See also:* Product Data Exchange Specification. (C) 610.6-1991w

(2) A specification for representing product data, defined by ANSI/ASME Y14.26M-1989. (ATLAS) 1226-1993s

initial ionizing event An ionizing radiation interaction event that initiates a tube count. (NI/NPS) 309-1999

initialization A process of setting initial values of variables, constants, state, and other artifacts to establish the startup conditions for an object. (IM/ST) 1451.1-1999

initialization packet Special packets that are only generated by the controller during the RamLink initialization process. There are three types of initialization packets: *sync, wait,* and *wake*. (C/MM) 1596.4-1996

initialization test A test or collection of tests that does not require cooperation of any other node(s) on the bus. The default and vendor-dependent initialization tests are invoked by writing to the TEST_START register. (C/MM) 1212-1991s

initialization vector (IV) A binary vector used at the beginning of a cryptographic operation to allow cryptographic chaining. (LM/C) 802.10-1992

initialize To set a variable, register, or other storage location to a starting value. *See also:* reset; clear. (C) 610.12-1990, 610.10-1994w

initializing state A node state that is reflected by the value of 1 in the STATE_CLEAR.*state* field. The initializing state is an optional transient state which is entered immediately after a power_reset or command_reset event. (C/MM) 1212-1991s

initial luminous exitance (illuminating engineering) The density of luminous flux leaving a surface within an enclosure before interreflections occur. *Note:* For light sources this is the luminous exitance as defined herein. For nonself-luminous surfaces it is the reflected luminous exitance of the flux received directly from sources within the enclosure or from daylight. (EEC/IE) [126]

initial MAC protocol data unit (IMPDU) A protocol data unit (PDU) formed in the DQDB Layer by the addition of protocol control information (including address information) to a MAC Service Data Unit received from the Logical Link Control (LLC) Sublayer. The IMPDU is segmented into 44-octet segmentation units for transfer in Derived MAC Protocol Data Units (DMPDUs). (LM/C) 8802-6-1994

initial memory space A portion of the initial node space, which provides a RAM-access window for a memory-controller unit architecture. Unit architectures can also be mapped to nonconflicting portions of the initial memory space. The initial memory space is only relevant to bus standards implementing 64-bit fixed addressing. (C/MM) 1212-1991s

initial node space (1) The address space that is initially mapped to a node. The initial node space contains the initial register space (2 Kbytes) and initial units space. On buses implementing 32-bit or 64-bit extended addressing, the initial units space is 4 Kbytes in size. On buses implementing 64-bit fixed addressing, the initial node space is 256 Tbytes in size and also includes the node's initial memory and private spaces. (C/MM) 1212-1991s

(2) The 256 terabytes of Serial Bus address space that is available to each node. Addresses within initial node space are 48 bits and are based at zero. The initial node space includes initial memory space, private space, initial register space, and initial units space. (C/MM) 1394a-2000

initial program load *See:* bootstrap.

initial program loader A bootstrap loader used to load that part of an operating system needed to load the remainder of the operating system. (C) 610.12-1990

initial register space (1) A 2-Kbyte portion of the initial node space that is adjacent to the initial units space. The registers defined by the CSR Architecture are located within the initial register space. The initial register space also provides addresses for defining bus-dependent registers. (C/MM) 1212-1991s

(2) The address space reserved for resources accessible immediately after a reset. This includes the registers defined by the CSR Architecture as well as those defined by this standard. (C/MM) 1394-1995

(3) A 2 kilobyte portion of initial node space with a base address of FFFF F000 0000_{16}. This address space is reserved for resources accessible immediately after a bus reset. Core registers defined by ISO/IEC 13213:1994 are located within initial register space, as are Serial Bus-dependent registers defined by this standard. (C/MM) 1394a-2000

initial relay actuation time The time of the first closing of a previously open contact or the first opening of a previously closed contact. (EEC/REE) [87]

initial slope The slope, in amperes per nanosecond (A/ns), that occurs at the start of the ESD current wave. *Synonym:* rising slope. (SPD/PE) C62.47-1992r

initial state The values assumed by the state variables of a system, component, or simulation at the beginning of some specified duration of time. *Contrast:* final state. (C) 610.3-1989w

initial symmetrical ground fault current (safety in ac substation grounding) The maximum root-mean-square (rms) value of symmetrical fault current after the instant of a ground fault initiation. As such, it represents the rms value of the symmetrical component in the first half-cycle of a current wave that develops after the instant of fault at time zero. Generally, $I_{f(0+)} = 3I_0''$ where $I_{f(0+)}$ = initial symmetrical ground fault current I_0'' = rms value of zero-sequenced symmetrical current that develops immediately after the instant of fault initiation; that is, reflecting the subtransient reactances of rotating machines contributing to the fault. *Note:* Elsewhere in the guide, this initial symmetrical fault current is shown in an abbreviated notation, as If, or is referred to only as 3i0. The underlying reason for this latter notation is that, for purposes of this guide, the initial symmetrical fault current is assumed to remain constant for the entire duration of the fault. (T&D/PE) 563-1978r

initial transient recovery voltage (ITRV) A component of the transient recovery voltage that appears in the very short time immediately after current interruption. The initial transient recovery voltage is a result of traveling waves on the substation bus adjacent to the circuit-switching device. (SWG/PE) C37.100-1992

initial units space (1) The portion of the initial node space that is adjacent to but above the initial register space. When its size is sufficient, unit architectures are expected to be located within this space. (C/MM) 1212-1991s
(2) A portion of initial node space with a base address of FFFF F000 0800_{16}. This places initial units space adjacent to and above initial register space. The CSR's and other facilities defined by unit architectures are expected to lie within this space. (C/MM) 1394a-2000

initial unloaded sag The sag of a conductor prior to the application of any external load. (NESC) C2-1997

initial unloaded tension The longitudinal tension in a conductor prior to the application of any external load. (NESC) C2-1997

initiating cause A cause that directly leads to the failure. (SWG/PE) C37.10-1995

initiating relay A programming relay whose function is to constrain the action of dependent relays until after it has operated. (SWG/PE) C37.100-1992

initiation queue A DMA queue that is used primarily to pass I/O transaction-initiation messages. (C/MM) 1212.1-1993

initiator (1) The function that starts an I/O transaction-initiation/transaction-completion exchange by sending an initiation message to the responder. (C/MM) 1212.1-1993
(2) The file service user that requests FTAM regime establishment. (C/PA) 1238.1-1994w

injected current The current that flows through the test circuit breaker from the voltage source of a current injection circuit when this circuit is applied to the test circuit breaker. (SWG/PE) C37.100-1992, C37.081-1981r, C37.083-1999

injected-current frequency (ac high-voltage circuit breakers) The frequency of the injected current. (SWG/PE) C37.100-1992, C37.083-1999, C37.081-1981r

injection fiber *See:* launching fiber.

injection laser diode (ILD) (fiber optics) A laser employing a forward-biased semiconductor junction as the active medium. *Synonyms:* diode laser; semiconductor laser. *See also:* chirping; superradiance; active laser medium; laser. (Std100) 812-1984w

injection time (ac high-voltage circuit breakers) The time with respect to the power frequency current zero when the voltage circuit is applied. (SWG/PE) C37.081-1981r, C37.083-1999, C37.100-1992

ink jet printer A nonimpact printer in which the characters are formed by projecting a jet of ink droplets onto paper. (C) 610.10-1994w

in-line (monitoring radioactivity in effluents) A system where the detector assembly is adjacent to or immersed in the total effluent stream. (NI) N42.18-1980r

in-line code A sequence of computer instructions that is physically contiguous with the instructions that logically precede and follow it. (C) 610.12-1990

in-line connection Connection of two heater cables together electrically in series or parallel on the same pipe. (IA) 515-1997

inline recovery Recovery performed by resuming a process at a point preceding the occurrence of a failure. *Contrast:* backward recovery; forward recovery. (C) 610.5-1990w

inner jacket A jacket that is extruded over the cable core covering to provide additional dielectric strength when it is needed between the conductors and the shield. An inner jacket may be used in cables that are used for direct burial and also where high ground potential rise is to be withstood. *See also:* cable jacket. (PE/PSC) 789-1988w

inner storage *See:* internal storage.

I_{nom} output The nominal load current for which the unit-under-test output voltage is required to be maintained within the specified operational limits; the value should be between the minimum and maximum values. (PEL) 1515-2000

inoperable time The part of down-time in which all environmental conditions are satisfied, during which a device would not yield correct results if it were operated. (C) 610.10-1994w

inorder traversal The process of traversing a binary tree in a recursive fashion as follows: the left subtree is traversed in order, then the root is visited, then the right subtree is traversed in order. *Synonym:* symmetric traversal. *Contrast:* preorder traversal; postorder traversal. *See also:* converse inorder traversal. (C) 610.5-1990w

in-phase spring rate (inertial sensors) (dynamically tuned gyro) The residual difference, in a dynamically tuned gyro, between the dynamically induced spring rate and the flexure spring rate. (PE/AES/PSE/GYAC) 762-1987w, 528-1994

in-phase video One of a pair of coherent, bipolar video signals derived from the RF or IF signal by a pair of synchronous detectors with a 90° phase difference between the coherent oscillator (coho) reference inputs used for each. *Note:* The in-phase component is often identified as *I* and the other of the pair as quadrature video or *Q*. *See also:* quadrature video. (AES) 686-1997

in-plant system A communications system whose parts, including remote terminals, may be all situated in one building or several buildings. *Synonym:* in-house system. (C) 610.7-1995

input (1) (A) (data transmission) The data to be processed. **(B) (data transmission)** The state or sequence of states occurring on a specified input channel. **(C) (data transmission)** The device or collective set of devices used for bringing data into another device. **(D) (data transmission)** A channel for impressing a state on a device or logic element. **(E) (data transmission)** The process of transferring data from an external storage to an internal storage. (PE) 599-1985
(2) (A) (software) Pertaining to data received from an external source. *Contrast:* output. **(B) (software)** Pertaining to a device, process, or channel involved in receiving data from an external source. *Contrast:* output. **(C) (software)** To receive data from an external source. *Contrast:* output. **(D) (software)** To provide data from an external source. *Contrast:* output. **(E) (software)** Loosely, input data. *Contrast:* output. (C) 610.12-1990
(3) Pertaining to a device, process, or channel involved in the reception of data. (C) 610.10-1994w
(4) (to a relay) A physical quantity or quantities to which the relay is designed to respond. *Notes:* 1. A physical quantity that is not directly related to the prescribed response of a relay

(though necessary, to or in some way affecting the relay operation), is not considered part of input. 2. Time is not considered a relay input, but it is a factor in performance. (SWG/PE) C37.100-1992

(5) In an IDEF0 model, that which is transformed by a function into output. (C/SE) 1320.1-1998

(6) A pin or port that shall only receive logic signals from a connected net or interconnect structure. (C/DA) 1481-1999

input angle (gyros) The angular displacement of the case about an input axis. (AES/GYAC) 528-1994

input area An area of storage reserved for input data. (C) 610.10-1994w

input argument The designation given to an operation argument that will always have a value at the invocation of the operation. *Contrast:* output argument. (C/SE) 1320.2-1998

input arrow An arrow or arrow segment that expresses IDEF0 input, i.e., an object type set whose instances are transformed by a function into output. The arrowhead of an input arrow is attached to the left side of a box. (C/SE) 1320.1-1998

input assertion (software) A logical expression specifying one or more conditions that program inputs must satisfy in order to be valid. *Contrast:* output assertion; loop assertion. *See also:* inductive assertion method. (C) 610.12-1990

input axis (IA) (1) (accelerometer) The axis along or about which an input causes a maximum output. (AES/GYAC) 528-1994

(2) (gyros) The axis about which a rotation of the case causes a maximum output. For a conventional gyro, the input axis is normal to the spin axis. For an optical gyro, the input axis is perpendicular to a plane established by the light beams. (AES/GYAC) 528-1994

input-axis misalignment (accelerometer) (gyros) The angle between an input axis and its associated input reference axis when the device is at a null condition. (The magnitude of this angle is unambiguous, but when components are reported, the convention should always be identified. IEEE standards use both direction cosines and right-handed Euler angles, depending on the principal field of application. Other conventions, differing both in signs and designation of axes, are sometimes used.) (AES/GYAC) 528-1994

input block (A) (test, measurement, and diagnostic equipment) A section of internal storage of a computer, reserved for the receiving and processing of input information. *Synonym:* input area. **(B) (test, measurement, and diagnostic equipment)** A block used as an input buffer. **(C) (test, measurement, and diagnostic equipment)** A block of machine words, considered as a unit and intended to be transferred from an external source or storage or storage medium to the internal storage of the computer. (MIL) [2]

input buffer *See:* buffer.

input buffer register A data buffer register that accepts data from an input unit such as a magnetic tape drive or magnetic disk and which then transfers this data to internal storage. (C) 610.10-1994w

input capacitance (*n*-terminal electron tubes) The short-circuit transfer capacitance between the input terminal and all other terminals, except the output terminal, connected together. *Note:* This quantity is equivalent to the sum of the interelectrode capacitances between the input electrode and all other electrodes except the output electrode. *See also:* electron-tube admittances. (ED) 161-1971w

input channel A channel employed only for data input; for example, to impress a state on a device or logic element; or to transfer data from an external storage unit to an internal storage unit. *See also:* input-output channel; output channel. (C) 610.10-1994w

input data (test pattern language) The binary data that is written into a memory array. It is identified by the symbol "D." (TT/C) 660-1986w

input device A device used to enter data into a computer system. *Note:* Commonly used input devices include light pens and keyboards. *Synonym:* input unit. *Contrast:* output device. *See also:* string device; cursor control device; logical input device; graphical input device; graphic input device; pick device; input-output device. (C) 610.10-1994w, 610.6-1991w, 1084-1986w

input impedance (1) (analog computer) In an analog computer, a passive network connected between the input terminal or terminals of an operational amplifier and its summing junction. (C) 165-1977w

(2) (at a transmission line port) (waveguide) The impedance at the transverse plane of the port. *Note:* This impedance is independent of the generator impedance. (MTT) 146-1980w

(3) The impedance between the signal input of the waveform recorder and ground. (IM/WM&A) 1057-1994w

(4) (of an antenna) The impedance presented by an antenna at its terminals. (AP/ANT) 145-1993

input jitter tolerance The maximum level of input jitter, specified in terms of unit intervals peak to peak, that does not result in an onset of errors. (COM/TA) 1007-1991r

input leakage current (amplifiers) A direct current (of either polarity) that would flow in a short circuit connecting the input terminals of an amplifier. (IM) 311-1970w

input limiter A limiter circuit employing biased diodes in the amplifier input channel, that operates by limiting current entering the summing junction. (C) 610.10-1994w

input limits (accelerometer) (gyros) The extreme values of the input, generally plus or minus, within which performance is of the specified accuracy. (AES/GYAC) 528-1994

input loopback Loopback of output from one function to be input for another function in the same diagram. (C/SE) 1320.1-1998

input media Media that are employed as input; for example, punched cards; magnetic disks. *Contrast:* output media. (C) 610.10-1994w

input-output Pertaining to input, output, or both. (C) 610.10-1994w

input-output area *See:* buffer.

input-output bound (io bound) Pertaining to any process that performs input-output operations which take a long time relative to the time of CPU operations performed. *Contrast:* compute-bound. (C) 610.10-1994w

input-output channel A channel that handles the transfer of data between internal storage and peripheral equipment. *Synonyms:* data channel; computer channel. *See also:* input-output controller; selector channel; output channel; input channel. (C) 610.7-1995, 610.10-1994w

input-output characteristic (1) (transmission performance of telephone sets) Electric or acoustic output level as a function of the input level. (COM/TA) 269-1983s

(2) The accompanying diagram shows the relationship between the input-output characteristics of an accelerometer or gyro. (AES/GYAC) 528-1994

input-output circuit A circuit that connects a computer to another device. (C) 610.10-1994w

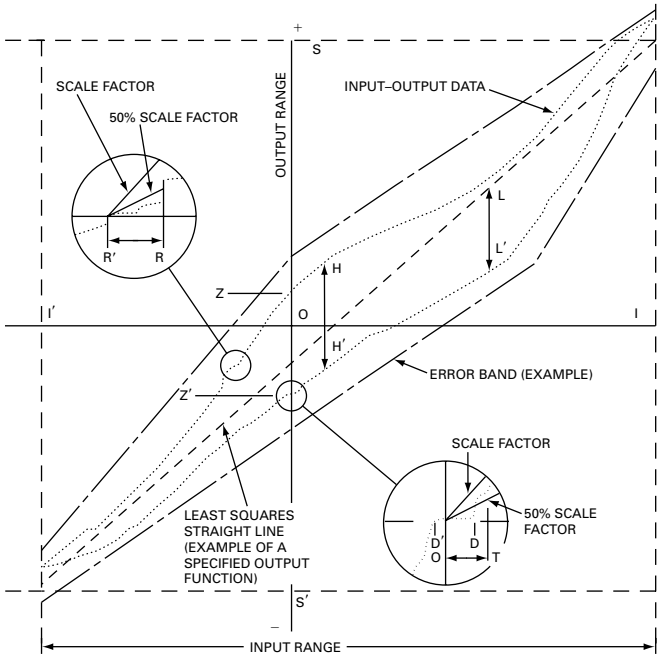
input-output control electronics The electronics required to interface an input-output device to a central processing unit. (C) 610.10-1994w

input-output controller (IOC) A controller that controls one or more input-output channels. *Synonym:* peripheral controller. *See also:* selector channel; input-output channel. (C) 610.7-1995, 610.10-1994w

input-output coupling *See:* data coupling.

input-output device A device through which data may be entered into a computer system, received from the system, or both. *Synonym:* input-output unit. *See also:* output device; input device. (C) 610.10-1994w

input/output model *See:* black box model.



input-output characteristics

Composite error = $\frac{100LL'}{OS}$ or $\frac{100LL'}{OS'}$

Dead band = DD'

Dynamic range = $\frac{OI}{RR'}$ or $\frac{OI'}{RR'}$

Hysteresis error = $HH' \cdot \frac{II'}{SS'}$

Input limits = I, I'

Input range = I' to I

Full range = $I - I'$

Output range = S' to S

Output span = $S - S'$

Resolution = RR'

Scale factor = $\frac{SS'}{II'}$

Threshold = OT

Zero offset = $\frac{Z + Z'}{2} \cdot \frac{II'}{SS'}$

input-output port A port that is configured or programmed to provide a data path between the central processing unit and its peripheral devices. (C) 610.10-1994w

input-output processor (IOP) A processor dedicated to controlling input and output transfers. (C) 610.10-1994w

input-output unit *See:* input-output device.

input pin A component pin that receives signals from the external connections. (TT/C) 1149.1-1990

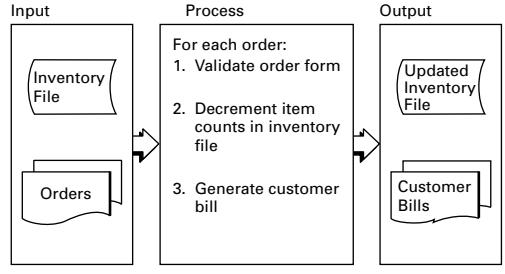
input power (total) (converters having dc input) (self-commutated converters) The mean value of the instantaneous power into the input terminals, taken over one period of the ripple component. *Note:* If either the voltage or the current is ripple-free, the dc power is the total power. (IA/SPC) 936-1987w

input power factor (of a system) The ratio at the input of active power (measured in watts or kilowatts) to input apparent power (measured in volt-amperes or kilovolt-amperes) at rated or specified voltage and load. *See also:* power factor, displacement; total power factor. (IA/PSE) 1100-1999

input primitive (1) (computer graphics) An element of data obtained from a logical input device. (C) 610.6-1991w **(2)** The effort to develop software products, expressed in units of staff-hours. (C/SE) 1045-1992

input-process-output (software) A software design technique that consists of identifying the steps involved in each process to be performed and identifying the inputs to and outputs from each step. *Note:* A refinement called hierarchical input-process-output identifies the steps, inputs, and outputs at both general and detailed levels of detail. *See also:* transaction analysis; modular decomposition; structured design; transform analysis; input-process-output chart; stepwise refinement; rapid prototyping. (C) 610.12-1990

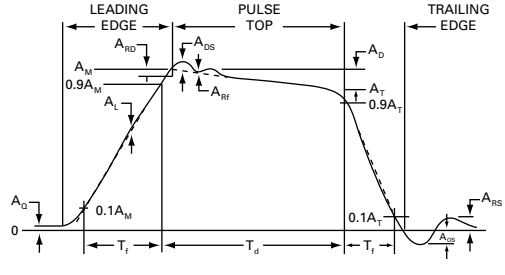
input-process-output chart (software) A diagram of a software system or module, consisting of a rectangle on the left listing inputs, a rectangle in the center listing processing steps, a rectangle on the right listing outputs, and arrows connecting inputs to processing steps and processing steps to outputs. *See also:* block diagram; graph; box diagram; bubble chart; structure chart.



input-process-output chart

(C) 610.12-1990

input pulse shape (pulse transformers) Current pulse or source voltage pulse applied through associated impedance. The shape of the input pulse is described by a current- or voltage-time relationship and is defined with the aid of the corresponding input pulse shape figure. *Note:* A general amplitude quantity is designated by A, which may be current I or voltage V. *See also:* return swing; tilt; pulse duration; trailing edge amplitude; voltage-time product; leading edge linearity; backswing; fall time; output pulse shape; pulse top; ringing; trailing edge; overshoot; voltage-time product rating; rise time; quiescent value; leading edge.



input pulse shape

(PEL/ET) 390-1987r

input queue The database that the service uses to convey objects to the client of the MT interface.

(C/PA) 1224.1-1993w

input range (accelerometer) (gyros) The region between the input limits within which a quantity is measured, expressed by stating the lower- and upper-range value. For example: an angular displacement input range of −5° to +6°. (AES/GYAC) 528-1994

input rate (gyros) The angular displacement per unit time of the case about an input axis. (AES/GYAC) 528-1994

input reference axis (accelerometer) (gyros) The direction of an axis (nominally parallel to an input axis) as defined by the case mounting surfaces or external case markings, or both. (AES/GYAC) 528-1994

input signal (1) (hydraulic turbines) A control sign injected at any point into a control system. (PE/EDPG) 125-1977s
(2) (control system feedback) A signal applied to a system or element. See the figure attached to definition "3" of error signal. *See also:* feedback control system. (PE/EDPG) 421-1972s, [3]

input signal level sensitivity (spectrum analyzer) The input signal level that produces an output equal to twice the value of the average noise alone. This may be power or voltage relationship, but must be stated so. *See also:* sensitivity; equivalent input noise sensitivity. (IM) 748-1979w

input span *See:* full range.

input station *See:* data input station.

input terminal (A) A terminal used to accept input. **(B)** Any point in a system or communication network at which data can enter the system. *Contrast:* output terminal. (C) 610.10-1994

input unit *See:* input device.

input variable A variable applied to a system or element. *See also:* feedback control system. (IM/PE/EDPG) [120], [3]

input voltage range (of a power system) The range of input voltage over which the system can operate properly. (IA/PSE) 1100-1999

input workstation *See:* data input station.

INQUIRE A nonprocedural database manipulation language used to access data stored in VSAM databases; characterized by its suitability for storage and retrieval of textual data. (C) 610.13-1993w

inrush The amount of current that a load or device draws when first energized. (IA/PSE) 1100-1999

inrush current (1) (electronic power transformer) The maximum root-mean-square or average current value, determined for a specified interval, resulting from the excitation of the transformer with no connected load, and with essentially zero source impedance, and using the minimum primary turns tap available and its rated voltage. (PEL/ET) 295-1969r
(2) (packaging machinery) Of a solenoid or coil, the steady-state current taken from the line with the armature blocked in the rated maximum open position. (IA/PKG) 333-1980w
(3) The rapid change of current with respect to time upon motor energization. Inrush current is dependent upon the voltage impressed across the motor terminals and the motor inductance by the relationship V = L di/dt. (PE/NP) 1290-1996

insert The station transmit signals will be routed to the next active downstream station, and input signals will be routed from the next active upstream station. (C/LM) 11802-4-1994

insertion (1) The opening of the capacitor bypass device to place the series capacitor in service with or without load current flowing. (T&D/PE) 824-1994
(2) A signalling pattern sent by a fibre optic station to request to join the ring (INSERT). This pattern consists of an alternating pattern of normal data signals and low light-level signals. (C/LM) 11802-4-1994

insertion character A character within a picture specification that represents a character that is inserted into the representation only under certain circumstances; for example, the value 1234, when represented using the picture specification 9,999 (the comma is the insertion character), is "1,234." (C) 610.5-1990w

insertion current The steady state root-mean-square current that flows through the series capacitor after the bypass device has opened. (T&D/PE) 824-1994

insertion/extraction levers (1) Mechanical levers used to provide a mechanical advantage during the insertion and extraction of a module to allow operation without tools. The insertion/extraction levers shall be part of each module. (C/BA) 1101.3-1993
(2) A generic term meaning levers that insert and extract the module. (C/BA) 1101.4-1993

insertion levers A device used to insert and extract the module. (C/BA) 1101.7-1995

insertion gain *See:* matched insertion gain; matched load insertion gain; matched generator insertion gain; general insertion gain.

insertion key echo The return of the Insertion Key to the station by the FOTCU. (C/LM) 11802-4-1994

insertion loss (1) (audible noise measurements) The insertion loss of a component (for example, a microphone windscreen) is the difference in decibels between the sound-pressure level measured before the insertion of the component and the sound-pressure level measured after the insertion of the component, provided that the source of the sound and all other conditions remain unchanged. The effect of the added component on the frequency response of a sound-measurement system should be considered and recorded. (T&D/PE) 656-1985s
(2) (data transmission) Resulting from the insertion of a transducer in a transmission system, the ratio of (A) the power delivered to that part of the system following the transducer, before insertion of the transducer, to (B) the power delivered to that same part of the system after insertion of the transducer. *Note:* If the input or output power, or both, consist of more than one component, such as multifrequency signal or noise, then the particular components used and their weighting are specified. (PE) 599-1985w
(3) (fiber optics) The total optical power loss caused by the insertion of an optical component such as a connector, splice, or coupler. (Std100) 812-1984w
(4) (overhead power lines) The difference, in decibels, between the sound pressure level of a component (e.g., windscreen) measured before the insertion of the component and the sound pressure level measured after the insertion of the component (provided that the source of the noise remains unchanged). (T&D/PE) 539-1990
(5) (broadband local area networks) The loss of signal level in a cable path caused by insertion of a passive device. *Synonym:* through loss. (LM/C) 802.7-1989r
(6) The signal loss that results when a channel is inserted between a transmitter and a receiver, which is the ratio of the signal level delivered to a receiver before a channel is inserted, to the signal level after the channel is inserted. (C/LM) 8802-5-1998, 610.7-1995
(7) *See also:* insertion loss. (COM/TA) 1007-1991r
(8) *See also:* matched insertion loss; matched generator insertion loss; matched load insertion loss; general insertion loss. (MTT) 146-1980w

insertion loss ripple The peak-to-peak variation of the insertion loss; i.e., the difference between the maximum and minimum insertion loss over a specified frequency range of the device. (UFFC) 1037-1992w

insertion reactor A reactor that is connected momentarily across the open contacts of a circuit-interrupting device for synchronizing and/or switching transient suppression purposes. (PE/TR) C57.16-1996

insertion sort A sort in which each item in the set to be sorted is inserted into its proper position among those items already considered. *See also:* linear sort; radix insertion sort; tree insertion sort; diminishing increment sort; binary insertion sort; list insertion sort; distribution counting sort; two-way insertion sort; address calculation sort. (C) 610.5-1990w

insertion voltage The steady state root-mean-square voltage appearing across the series capacitor upon the interruption of the bypass current with the opening of the bypass device. (T&D/PE) 824-1994

insert receiver A receiver that uses an ear mold or ear tip inserted into the ear canal. (COM/TA) 1206-1994

in service (1) (power system measurement) (electric generating unit reliability, availability, and productivity) The state in which a unit is electrically connected to the system. (PE/PSE) 762-1987w

(2) Lines and equipment are considered in service when connected to the system and intended to be capable of delivering energy or communication signals, regardless of whether electric loads or signaling apparatus are presently being served from such facilities. (NESC) C2-1997

in-service forced derated hours (electric generating unit reliability, availability, and productivity) The in-service hours during which a Class 1, 2, or 3 unplanned derating was in effect. (PE/PSE) 762-1987w

in-service inspection Visual periodic investigation of the principal features of the circuit breaker in service, without dismantling. This investigation is generally directed toward pressures and/or levels of fluids, tightness, position of relays, pollution of insulating parts; but actions such as lubricating, cleaning, washing, etc., that can be carried out with the circuit breaker in service, are included. *Note:* The observations resulting from inspection can lead to the decision of carrying out overhaul. (SWG/PE) C37.10-1995

in-service maintenance derated hours (electric generating unit reliability, availability, and productivity) The in-service hours during which a Class 4 unplanned derating was in effect. (PE/PSE) 762-1987w

in-service planned derated hours (electric generating unit reliability, availability, and productivity) The in-service hours during which a basic or extended planned derating was in effect. (PE/PSE) 762-1987w

in-service state The component or unit is energized and fully connected to the system. (PE/PSE) 859-1987w

in-service test (metering) A test made during the period that the meter is in service. It may be made on the customer's premises without removing the meter from its mounting, or by removing the meter for test, either on the premises or in a laboratory or meter shop. (ELM) C12.1-1982s

in-service unit derated hours (electric generating unit reliability, availability, and productivity) The in-service hours during which a unit derating was in effect. (PE/PSE) 762-1987w

in-service unplanned derated hours (electric generating unit reliability, availability, and productivity) The in-service hours during which an unplanned derating was in effect. (PE/PSE) 762-1987w

inside air temperature *See:* average inside air temperature.

inside communications cables A telephone-type cable intended for indoor use that is not designed to withstand solar radiation or precipitation and may or may not be shielded. (PE/PSC) 789-1988w

inside top air temperature (power and distribution transformers) The temperature of the air inside a dry-type transformer enclosure, measured in the space above the core and coils. (PE/TR) C57.12.80-1978r

in sight from (within sight from, within sight) Where this Code specifies that one equipment shall be "in sight from," "within sight from," or "within sight", etc., of another equipment, one of the equipments specified shall be visible and not more than 50 ft distant from the other. (NESC/NEC) [86]

***in situ* study** Referring to studies involving organisms in their natural condition or environment. (T&D/PE) 539-1990

in-situ total dose test A test of the instantaneous effects of an environment containing radiation obtained by monitoring the device characteristics during exposure to a relatively low, constant dose rate. (ED) 641-1987w

inspection (1) (nuclear power quality assurance) Examination or measurement to verify whether an item or activity conforms to specified requirements. (PE/NP) [124]

(2) (software) A static analysis technique that relies on visual examination of development products to detect errors, violations of development standards, and other problems. Types include code inspection; design inspection. (C) 610.12-1990

(3) A visual examination of a software product to detect and identify software anomalies, including errors and deviations from standards and specifications. Inspections are peer examinations led by impartial facilitators who are trained in inspection techniques. Determination of remedial or investigative action for an anomaly is a mandatory element of a software inspection, although the solution should not be determined in the inspection meeting. (C/SE) 1028-1997

inspection and test plan (ITP) A summary of prerequisites, system configurations, step-by-step procedures, and evaluation criteria of the tests in one place for permanent record. (SUB/PE) 1303-1994

inspection, meter installation *See:* meter installation inspection.

inspector (nuclear power quality assurance) A person who performs inspection activities to verify conformance to specific requirements. (PE/NP) [124]

installation The period of time in the software life cycle during which a software product is integrated into its operational environment and tested in this environment to ensure that it performs as required. (C/SE) 1074-1995s, 610.12-1990

installation manual A document that provides the information necessary to install a system or component, set initial parameters, and prepare the system or component for operational use. *See also:* user manual; programmer manual; operator manual; diagnostic manual; support manual. (C) 610.12-1990

installed incremental transfer capability (power operations) The amount of power, incremental above normal base power transfers, that can be transferred over the transmission network without giving consideration to the effect of transmission facility outages. All facility loadings are within normal ratings and all voltages are within normal limits. (PE/PSE) 858-1987s

installed life (1) (electric penetration assemblies) The interval of time from installation to permanent removal from service, during which the electric penetration assembly is expected to perform its required function(s). *Note:* Components of the assembly may require periodic replacement; thus, the installed life of such components is less than the installed life of the assembly. (PE/NP) 317-1983r

(2) (safety systems equipment in nuclear power generating stations) (valve actuators) The interval from installation to removal, during which the equipment or component thereof may be subject to design service conditions and system demands. *Note:* Equipment may have an installed life of 40 years with certain components changed periodically; thus, the installed life of the changed components would be less than 40 years. (SWG/PE/NP) 382-1985, 627-1980r, C37.100-1992, 323-1974s, 649-19802s

(3) (Class 1E battery chargers and inverters) The interval from installation to removal, during which the equipment or component thereof may be subject to design service conditions and system demands. *Note:* Equipment may have an installed life of 20 years with certain components changed periodically; thus, the installed life of the components would be less than 20 years. (PE/NP) 650-1979s

installed nameplate capacity (electric generating unit reliability, availability, and productivity) The full-load continuous gross capacity of a unit under specified conditions, as calculated from the electric generator nameplate based on the rated power factor. *Note:* The nameplate rating of the electric generator may not be indicative of the unit maximum or dependable capacity, since some other item or equipment (such

as the turbine) may limit unit output. (PE/PSE) 762-1987w

installed reserve (power operations) (electric power supply) The reserve capacity installed on a system. (PE/PSE) 858-1987s, 346-1973w

installed software Any software object created by the use of the `swinstall` utility. (C/PA) 1387.2-1995

installed_software A software_collection containing installed software. This software is in a state ready for use, or ready to be shared by client systems. A directory path on a system and an installed_software catalog together identify a unique installed_software object. (C/PA) 1387.2-1995

installed_software catalog The catalog of metadata for an installed_software software_collection. Unlike a catalog for a distribution object, the storage and format of an installed_software catalog is undefined within this standard. The ability to dump and restore all or part of an installed_software catalog into an exported catalog structure is included in this standard. (C/PA) 1387.2-1995

installed_software path The root directory of an installed_software object; the pathname below which all software for that object shall be installed. (C/PA) 1387.2-1995

installer *See:* constructor.

Instance (1) The mapping of an Activity that processes all of its Input Information and generates all of its Output Information. *Contrast:* Invocation; Iteration. *See also:* mapping. (C/SE) 1074-1997

(2) *See also:* package instance.

instance (1) A discrete, bounded thing with an intrinsic, immutable, and unique identity. Anything that is classified into a class is said to be an instance of the class. All the instances of a given class have the same responsibilities, i.e., they possess the same kinds of knowledge, exhibit the same kinds of behavior, participate in the same kinds of relationships, and obey the same rules. (C/SE) 1320.2-1998

(2) The specific object that results from allocating resources to implement a single consistent set of internal variables required for the operations and behavior defined for a class definition. (IM/ST) 1451.1-1999

(3) An individual occurrence of an entity that belongs to a particular type of entity. (SCC32) 1489-1999

instance-level attribute A mapping from the instances of a class to the instances of a value class. (C/SE) 1320.2-1998

instance-level operation A mapping from the (cross product of the) instances of the class and the instances of the input argument types to the (cross product of the) instances of the other (output) argument types. (C/SE) 1320.2-1998

instance-level responsibility A kind of responsibility that applies to each instance of the class individually. *Contrast:* class-level responsibility. (C/SE) 1320.2-1998

instance net An abstraction expressing the idea of an electrical connection between various points in a design. In a hierarchical representation of the design, nets can occur at all levels and may connect to pins of lower hierarchical levels (including cell instances), ports of the current hierarchical level, and each other. In a flattened (unfolded and elaborated) design, electrically connected nets are collapsed and each net instance corresponds to an unique interconnect structure in the implementation. (C/DA) 1481-1999

instantaneous A qualifying term indicating that no delay is purposely introduced in the action of the device. (SWG/PE) C37.100-1992

instantaneous access *See:* immediate access.

instantaneous automatic gain control (IAGC) (nonlinear, active, and nonreciprocal waveguide components) (radar) A fast-acting automatic gain control that responds to variations of received signal, avoiding receiver saturation. (MTT) 457-1982w

(2) (A) That part of a receiver system that automatically adjusts the gain of an amplifier within the time duration of each pulse so that a substantially constant output pulse peak amplitude is obtained when the input pulse peak amplitudes are varying, the adjustment being sufficiently fast to operate during the time a pulse is passing through the amplifier. **(B)** A quick-acting automatic gain control that responds to variations of mean clutter or jamming level over different range or angular regions, avoiding receiver saturation. (AES) 686-1997

instantaneous demand (power operations) The load at any instant. (PE/PSE) 858-1987s, 346-1973w

instantaneous frequency (1) (data transmission) The time rate of change of the angle of an angle-modulated wave. *Note:* If the angle is measured in radians, the frequency in hertz is the time rate of change of the angle divided by 2. (PE) 599-1985w

(2) $1/(2\pi)$ times the time rate of change of phase of a wave. (AP/PROP) 211-1997

instantaneous overcurrent or rate-of-rise relay (power system device function numbers) A relay that functions instantaneously on an excessive value of current or on an excessive rate of current rise. (PE/SUB) C37.2-1979s

instantaneous peak power (waveguide) The maximum instantaneous power passing through the transverse section of a waveguide during the interval of interest. (MTT) 146-1980w

instantaneous phase or ground trip element *See:* instantaneous; direct-acting overcurrent trip device.

instantaneous power (1) (circuit) At the terminals of entry into a delimited region the rate at which electric energy is being transmitted by the circuit into or out of the region. *Note:* Whether power into the region or out of the region is positive is a matter of convention and depends upon the selected reference direction of energy flow. (Std100) 270-1966w

(2) (polyphase circuit) At the terminals of entry into a delimited region, the algebraic sum of the products obtained by multiplying the voltage between each terminal of entry and some arbitrarily selected common point in the boundary surface (which may be neutral terminal of entry) by the current through the corresponding terminal of entry. *Notes:* 1. The reference direction of each current must be the same, either into or out of the delimited region. The reference polarity for each voltage must be consistently chosen, either with all the positive terminals at the terminals of entry and all negative terminals at the common reference point, or vice-versa. If the reference direction for currents is into the delimited region and the positive reference terminals for voltage are at the phase terminals of entry, the power will be positive when the energy flow is into the delimited region and negative when the flow is out of the delimited region. Reversal of either the reference direction or the reference polarity will reverse the relation between the sign of the power and the direction of energy flow. 2. When the circuit has a neutral terminal of entry, it is usual to select the neutral terminal as the common point for voltage measurement, because one of the voltages is then always zero, and, when both the currents and voltages form symmetrical polyphase sets of the same phase sequence, the average power for each single-phase circuit consisting of one phase conductor and the neutral conductor, will be the same. When the voltages and currents are sinusoidal and the voltages are measured to the neutral terminal of entry as the common point, the instantaneous power at the four points of entry of a three-phase circuit with neutral is given by

$$p = E_a I_a [\cos(\alpha_a - \beta_a) + \cos(2\omega t + \alpha_a + \beta_a)] + E_b I_b [\cos(\alpha_b - \beta_b) + \cos(2\omega t + \alpha_b + \beta_b)] + E_c I_c [\cos(\alpha_c - \beta_c) + \cos(2\omega t + \alpha_c + \beta_c)]$$

where E_a, E_b, E_c are the root-mean-square amplitudes of the voltages from the phase conductors, a, b, and c, respectively, to the neutral conductor at the terminals of entry; I_a, I_b, I_c are the root-mean-square amplitudes of the currents in the phase conductors a, b, and c. a_a, a_b, a_c are the phase angles of the voltages E_a, E_b, E_c with respect to a common reference; β_a, β_b, β_c are the phase angles of the currents I_a, I_b, I_c with respect to the same reference as the voltages. 3. If there is no neutral

conductor, so that there are only three terminals of entry, the point of entry of one of the phase conductors may be chosen as the common voltage point, and the voltages from that conductor to the common point become zero. If, in the preceding, the terminal of entry of phase conductor b is chosen as the common point, E_a is replaced by E_{ab} in the first line, E_c is replaced by E_{cb} in the third line, and the second line, being zero, is omitted. 4. If both the voltages and currents in the preceding equations constitute symmetrical polyphase sets of the same phase sequence, then $p = 3E_aI_a \cos(\alpha_a - \beta_a)$. Because this expression and similar expressions for m phases are independent of time, it follows that the instantaneous power is constant when the voltages and currents constitute polyphase symmetrical sets of the same phase sequence. 5. However, if the polyphase sets have single-phase symmetry or zero-phase symmetry rather than polyphase symmetry, the higher frequency terms do not cancel, and the instantaneous power is not a constant. 6. In general, the instantaneous power p at the $(m + 1)$ terminals of entry of a polyphase circuit of m phases to a delimited area, when one of the terminals is that of the neutral conductor, is expressed by the equation

$$p = \sum_{s=1}^{s=m} e_s i_s$$
$$= \sum_{s=1}^{s=m} \sum_{r=1}^{r=\infty} \sum_{q=1}^{q=\infty} E_{sr} I_{sq}$$
$$(\cos[(r - q)\omega t + \alpha_{sr} - \beta_{sq}]$$
$$+ \cos[(r + q)\omega t + \alpha_{sr} + \beta_{sq}])$$

where e_s is the instantaneous alternating voltage between the sth terminal entry and the terminal of voltage reference, which may be the true neutral point, the neutral conductor, or another point in the boundary surface. i_s is the instantaneous alternating current through the sth terminal of entry. E_{sr} is the root-mean-square amplitude of the rth harmonic of voltage e_s. I_{sq} is the root-mean-square amplitude of the qth harmonic of current i_s. αi_{sr} is the phase angle of the rth harmonic of e_s with respect to a common reference. β_{sq} is the phase angle of the qth harmonic of i_s with respect to the same reference as the voltages. The index s runs through the phase letters identifying the m-phase conductor of an m-phase system, a, b, c, etc., and then concludes with the neutral conductor n, if one exists. The indexes r and q identify the order of the harmonic term in each e_s and i_s, respectively, and run through all the harmonics present in the Fourier series representation of each alternating voltage and current. If the terminal voltage reference is that of the neutral conductor, the terms for $s = n$ will vanish. If the voltages and current are quasi-periodic, of the form given in "power, instantaneous (two-wire circuit)," this expression is still valid but E_{sr} and I_{sq} become periodic functions of time. 7. Instantaneous power is expressed in watts when the voltages are in volts and the currents in amperes. *See also:* zero-phase symmetrical set; single-phase symmetrical set. (Std100) 270-1966w

(3) (two-wire circuit) At the two terminals of entry into a delimited region, the product of the instantaneous voltage between one terminal of entry and the second terminal of entry, considered as the reference terminal, and the current through the first terminal. *Notes:* 1. The entire path selected for the determination of each voltage must lie in the boundary surface of the delimited region or be so selected that the voltage is the same as that analog such a path. 2. Mathematically the instantaneous power p is given by $p = ei$ in which e is the voltage between the first terminal of entry and the second (reference) terminal of entry and i is the current through the first terminal of entry in the reference direction. 3. If both the voltage and current are sinusoidal and of the same period, the instantaneous power at any instant t is given by the equation

$$p = ei = [(2)^{1/2} E \cos(\omega t + \alpha)]$$
$$\times [(2)^{1/2} I \cos(\omega t + \beta)]$$
$$= 2EI\cos(\omega t + \alpha) \cos(\omega t + \beta)$$
$$= EI[\cos(\alpha - \beta) + \cos(2\omega t + \alpha + \beta)]$$

in which E and I are the root-mean-square amplitudes of voltage and current, respectively, and α and β are the phase angles of the voltage and current, respectively, from the same reference. 4. If the voltage is an alternating voltage and the current is an alternating current of the same primitive period [see alternating voltage; alternating current; and period (primitive period) of a function], the instantaneous power is given by the equation

$$p = ei$$
$$= E_1I_1[\cos(\alpha_1 - \beta_1) + \cos(2\omega t + \alpha_1 + \beta_1)]$$
$$+ E_2I_2[\cos(\omega t + \alpha_2 - \beta_1) + \cos(3\omega t + \alpha_2 + \beta_1)]$$
$$= E_1I_2[\cos(\omega t - \alpha_1 + \beta_2) + \cos(3\omega t + \alpha_1 + \beta_2)]$$
$$+ E_2I_2[\cos(\alpha_2 - \beta_2) + \cos(4\omega t + \alpha_2 + \beta_2)]$$
$$+ \ . \ . \ .$$

This equation can be written conveniently as a double summation

$$p = \sum_{r=1}^{r=\infty} \sum_{q=1}^{q=\infty} E_rI_q \cos[(r - q)\omega t + \alpha_r - \beta_q]$$
$$+ \cos[(r + q)\omega t + \alpha_r - \beta_q]$$

in which r is the order of the harmonic component of the voltage and q is the order of the harmonic component of the current (see "harmonic components (harmonics)"), and E, I, α, and β apply to the harmonic denoted by the subscript. 5. If the voltage and current are quasi-periodic functions of the form

$$e = (2)^{1/2} \sum_{r=1}^{r=\infty} E_r(t)\cos(r\omega t + \alpha_r)$$

$$i = (2)^{1/2} \sum_{q=1}^{q=\infty} I_q(t)\cos(q\omega + \beta_r)$$

where $E_r(t)$, $I_q(t)$ are aperiodic functions of t, the instantaneous power is given by the equation

$$p = ei$$
$$= E_1(t)I_1(t) [\cos(\alpha_1 - \beta_1)$$
$$+ \cos(2\omega t + \alpha_1 + \beta_1)]$$
$$+ E_2(t)I_1(t) [\cos(\omega t + \alpha_2 - \beta_1)$$
$$+ \cos(3\omega t + \alpha_2 + \beta_1)]$$
$$+ E_1(t)I_2(t) [\cos(\omega t - \alpha_1 + \beta_2)$$
$$+ \cos(3\omega t + \alpha_1 + \beta_2)]$$
$$+ E_2(t)I_2(t) [\cos(\alpha_2 - \beta_2)$$
$$+ \cos(4\omega t + \alpha_2 + \beta_2)]$$
$$+ \ . \ . \ .$$

6. Instantaneous power is expressed in watts when the voltage is in volts and the current in amperes. 7. See "reference direction of energy." The sign of the energy will be positive if the flow of power is in the reference direction and negative if the flow is in the opposite direction. (Std100) 270-1966w

instantaneous power output The rate at which energy is delivered to a load at a particular instant. *See also:* radio transmitter. (AP/ANT) 145-1983s

instantaneous Poynting vector ($\vec{\mathbf{P}}(\mathbf{t},\vec{\mathbf{r}})$) (of an electromagnetic wave) The vector product of the instantaneous electric and magnetic field vectors. The integral of $\vec{P}(t, \vec{r})$ over a surface is the instantaneous electromagnetic power flow through the surface. (AP/PROP) 211-1997

instantaneous recording (mechanical recording) A phonograph recording that is intended for direct reproduction without further processing. *See also:* phonograph pickup. (SP) [32]

instantaneous relay recovery time Recovery time of a thermal relay measured when the heater is de-energized at the instant of contact operation. (EEC/REE) [87]

instantaneous relay reoperate time Reoperate time of a thermal relay measured when the heater is de-energized at the instant of contact operation. (EEC/REE) [87]

instantaneous sampling The process for obtaining a sequence of instantaneous values of a wave. *Note:* These values are called instantaneous samples. (AP/ANT) 145-1983s

instantaneous sound pressure (at a point) The total instantaneous pressure at that point minus the static pressure at that point. *Note:* The commonly used unit is the newton per square meter. (SP) [32]

instantaneous storage *See:* immediate access storage.

instantaneous suppression with automatic current regulation (thyristor) A combination of instantaneous trip or suppression and current regulation in which suppression is followed immediately by a regulated current. (IA/IPC) 428-1981w

instantaneous trip (1) (as applied to Circuit Breakers) A qualifying term indicating that no delay is purposely introduced in the tripping action of the circuit breaker. (NESC) [86]
(2) The means to sense an overload and reduce the output current to zero, as fast as practicable. (IA/IPC) 428-1981w

instantiation (software) The process of substituting specific data, instructions, or both into a generic program unit to make it usable in a computer program. (C) 610.12-1990

instant of chopping The instant when the initial discontinuity appears. (PE/PSIM) 4-1995

instant start fluorescent lamp (illuminating engineering) A fluorescent lamp designed for starting by a high voltage without preheating of the electrodes. (EEC/IE) [126]

Institute of Electrical and Electronics Engineers (1) An organization that, among other functions, sponsors standards development. (C/BA) 14536-1995
(2) An international professional organization that is accredited by American National Standards Institute to develop standards for them. (C) 610.7-1995, 610.10-1994w

institutional design Emphasizes reliability, resistance to wear and use, safety to public, and special aesthetic considerations, such as the "agelessness" of the structure. (IA/PSE) 241-1990r

instruction (1) (programmable digital computer systems in safety systems of nuclear power generating stations) A meaningful expression in a computer programming language that specifies an operation to a digital computer. 554-1990
(2) (btl interface circuits) A binary data word shifted serially into the test logic defined by this standard in order to define its subsequent operation. (TT/C) 1149.1-1990
(3) (software) *See also:* computer instruction. (C) 610.12-1990
(4) A statement or expression consisting of an operation and its operands (if any), which can be interpreted by a computer in order to perform some function or operation. *See also:* computer instruction; microinstruction; macroinstruction. (C) 610.10-1994w

instruction address (A) The address of an instruction. **(B)** The address that must be used to fetch an instruction. (C) 610.10-1994

instruction address register An address register used to hold the address of an instruction. *Synonyms:* instruction pointer register; program register. *See also:* P register. (C) 610.10-1994w

instruction address stop An instruction address that, when it is fetched, causes execution to stop. *See also:* address stop. (C) 610.10-1994w

instructional character *See:* control character.

instructional game An instruction method employed by some computer-assisted instruction systems, in which a game is used to instruct the student on some subject. *Contrast:* simulation. (C) 610.2-1987

instructional simulation (modeling and simulation) A simulation intended to provide an opportunity for learning or to evaluate learning or educational potential; for example, a simulation in which a mock-up of an airplane cockpit is used to train student pilots. *Synonyms:* academic simulation; tutorial simulation. (C) 610.3-1989w

instruction cache A cache that stores instructions for fast access by the processor. *Contrast:* data cache. (C) 610.10-1994w

instruction code *See:* computer instruction code.

instruction control unit In a processor, the part that retrieves instructions in proper sequence, interprets each instruction, and applies the proper signals to the arithmetic and logic unit and other parts in accordance with this interpretation. *Synonym:* computer control unit. (C) 610.10-1994w

instruction counter (IC) (software) A register that indicates the location of the next computer instruction to be executed. *Synonym:* program counter. (C) 610.12-1990

instruction cycle (software) The process of fetching a computer instruction from memory and executing it. *See also:* instruction time. (C) 610.12-1990, 610.10-1994w

instruction decoder (A) The portion of the computer that determines which functions of the execution unit and the operand handler must be performed to execute the instruction. *Note:* Often implemented as part of the instruction fetch unit. **(B)** A functional component that analyzes the operation to be performed, as indicated in an instruction. *See also:* instruction processor. (C) 610.10-1994

instruction fetch unit The portion of a computer that reads the next instruction word from memory and converts the commands to the internal format used by the instruction decoder. (C) 610.10-1994w

instruction field A bit field within an instruction word. (C/MM) 1754-1994

instruction format The number and arrangement of the fields (operand, operation, and address) in a computer instruction. *See also:* address format. (C) 610.10-1994w, 610.12-1990

instruction length (software) The number of words, bytes, or bits needed to store a computer instruction. (C) 610.12-1990

instruction modifier (software) A word or part of a word used to alter a computer instruction. (C) 610.12-1990

instruction pointer register *See:* instruction address register.

instruction processor A functional component that carries out the action indicated by the instruction decoder, resulting in a possible change of machine or data state; for example, instruction decision and execution. (C) 610.10-1994w

instruction register A register that is used to hold an instruction for interpretation. (C) 610.10-1994w

instruction repertoire *See:* instruction set.

instruction set The complete set of instructions recognized by a given computer or provided by a given programming language. *Note:* In computer hardware, this term is considered to be synonymous with a computer's architecture. *Synonym:* instruction repertoire. *See also:* computer instruction set. (C) 610.10-1994w, 610.12-1990

instruction set architecture (1) (software) An abstract machine characterized by an instruction set. *See also:* abstract machine; instruction set. (C/SE) 729-1983s
(2) An ISA defines instructions, registers, instruction and data memory, the effect of executed instructions on the registers and memory, and an algorithm for controlling instruction execution. An ISA does not define clock-cycle times, cycles per instruction, data paths, etc. This standard defines an ISA. (C/MM) 1754-1994

instruction time (1) (software) The time it takes a computer to fetch an instruction from memory and execute it. *See also:* instruction cycle. (C) 610.12-1990, 610.10-1994w
(2) The time it takes to perform one instruction cycle. (C) 610.10-1994w

instruction trace *See:* trace.

instruction word A word that represents an instruction. *See also:* very long instruction word. (C) 610.10-1994w

instrument (1) (plutonium monitoring) A complete system designed to quantify a particular type of ionizing radiation. (NI) N317-1980r

(2) (radiation protection) A complete system designed to quantify one or more particular ionizing radiation or radiations. (NI) N323-1978r

(3) (software) In software and system testing, to install or insert devices or instructions into hardware or software to monitor the operation of a system or component. (C) 610.12-1990

(4) (airborne radioactivity monitoring) A complete system designed to quantify one or more characteristics of ionizing radiation or radioactive material. (NI) N42.17B-1989r

(5) A device whose purpose is usually the generation or measurement of a class of signal. (SCC20) 1226-1998

instrumentation (software) Devices or instructions installed or inserted into hardware or software to monitor the operation of a system or component. (C) 610.12-1990

instrumentation cable A cable that carries low level electric energy from a transducer to a measuring or controlling device. It may be used in environments such as high temperature, high radiation levels, and high electromagnetic fields. An instrument cable may consist of a group of two or more paired or unpaired, shielded or unshielded, solid or stranded insulated conductors. (PE/PSC) 789-1988w

instrumentation tool (software) A software tool that generates and inserts counters or other probes at strategic points in another program to provide statistics about program execution such as how thoroughly the program's code is exercised. *See also:* program; execution; code. (C/SE) 729-1983s

instrument cable Cable used for instrument applications where the cable construction is generally 300 V, twisted pairs or triads, in wire sizes 16 AWG (1.31 mm^2) or 18 AWG (0.823 mm^2). For the purposes of this document, coaxial, triaxial, and fiber optic cables are not considered instrument cable because of differences in cable installation limits. (PE/IC) 1185-1994

instrument landing system (ILS) (1) (general) A generic term for a system which provides the necessary lateral, longitudinal and vertical guidance in an aircraft for a low approach or landing. *Synonym:* ILS.

(2) (navigation) An internationally adopted instrument landing system for aircraft, consisting of a vhf localizer, a uhf glide slope and 75 MHz markers. *See also:* instrument landing system reference point. (AES/RS) 686-1982s, [42]

instrument landing system marker beacon *See:* navigation; boundary marker.

instrument landing system reference point (electronic navigation) A point on the centerline of the instrument landing system runway designated as the optimum point of contact for landing: in standards of the International Civil Aviation Organization this point is from 500 to 1000 feet from the approach end of the runway. *See also:* navigation. (AES) [42]

instrument multiplier A particular type of series resistor that is used to extend the voltage range beyond some particular value for which the instrument is already complete. *See also:* auxiliary device to an instrument; voltage range multiplier. (EEC/AII) [102]

instrument quality control chart A chart developed to evaluate an instrument's response to predetermined, statistically-based limits as determined by an appropriate QC source. The predetermined statistical limits are not typically developed with the overall quality performance (bias and precision) parameters for an analytical technique in mind. (NI) N42.23-1995

instrument relay A relay whose operation depends upon principles employed in measuring instruments such as the electrodynamometer, iron vane, D'Arsonval galvanometer, and moving magnet. *See also:* relay. (EEC/REE) [87]

instrument response (1) (dynamic) The behavior of the instrument output as a function of the measured signal, both with respect to time. *See also:* frequency response; accuracy rating; ramp response; step response. (EEC/EMI) [112]

(2) (forced) The total steady-state plus transient time response resulting from an external input. (IM) [120]

instrument shunt (direct-current instrument shunts) A particular type of resistor designed to be connected in parallel with the measuring device to extend the current range beyond some particular value for which the instrument is already complete. (PE/PSIM) 316-1971w

instrument switch A switch used to connect or disconnect an instrument, or to transfer it from one circuit or phase to another. *Examples:* Ammeter switch, voltmeter switch. (SWG/PE) C37.100-1992

instrument terminals (direct-current instrument shunts) Those terminals which provide a voltage drop proportional to the current in the shunt and to which the instrument or other measuring device is connected. (PE/PSIM) 316-1971w

instrument tolerance chart A chart developed to evaluate an instrument's response to a predetermined, tolerance level as determined by an appropriate quality control source. The predetermined tolerance level, typically expressed as a percent, is set with the overall quality performance (bias and precision) parameters for an analytical technique in mind. For practical reasons, the response of most instruments is held in control to a tolerance not to exceed 3 and 5 percent as related to the initial instrument calibration. (NI) N42.23-1995

instrument transformer (1) (power and distribution transformers) A transformer that is intended to reproduce in its secondary circuit, in a definite and known proportion, the current or voltage of its primary circuit, with the phase relations and waveform substantially preserved. *See also:* voltage transformer; transformer correction factor; phase angle correction factor; marked ratio; true ratio; window-type current transformer; three-wire type current transformer; rated secondary voltage; percent ratio; ratio correction factor; double-secondary current transformer; phase angle of an instrument transformer; excitation losses for an instrument transformer; thermal burden rating of a voltage transformer; polarity; multi-ratio current transformer; cascade-type voltage transformer; insulated-neutral terminal type voltage transformer; rated current; double-secondary voltage transformer; current transformer; rated secondary current; fused-type voltage transformer; multiple-secondary current transformer; rated voltage. (PE/PSR/TR) C37.110-1996, C57.12.80-1978r

(2) One that is intended to reproduce in its secondary circuit, in a definite and known proportion, the current or voltage of its primary circuit with the phase relations substantially preserved. (PE/TR) C57.13-1993

instrument transformer—accuracy class The limits of transformer correction factor, in terms of percent error, that have been established to cover specific performance ranges for line power factor conditions between 1.0 and 0.6 lag. (ELM) C12.1-1988

instrument tranformer—accuracy rating for metering The accuracy class, together with a standard burden for which the accuracy class applies. (ELM) C12.1-1988

instrument-transformer correction factor *See:* transformer correction factor.

insulated (1) Separated from other conducting surfaces by a dielectric substance or air space permanently offering a high resistance to the passage of current and to disruptive discharge through the substance or space. *Note:* When any object is said to be insulated, it is understood to be insulated in a manner suitable for the conditions to which it is subjected. Otherwise, within the purpose of this definition, it is uninsulated. Insulating covering of conductors is one means for making the conductors insulated. (IA/PC) 463-1993w

(2) Separated from other conducting surfaces by a dielectric (including air space) offering a high resistance to the passage of current. *Note:* When any object is said to be insulated, it is understood to be insulated for the conditions to which it is normally subjected. Otherwise, it is, within the purpose of these rules, uninsulated. (NESC) C2-1997

insulated bearing (rotating machinery) A bearing that is insulated to prevent the circulation of stray currents. *See also:* bearing. (PE) [9]

insulated bearing housing (rotating machinery) A bearing housing that is electrically insulated from its supporting structure to prevent the circulation of stray currents. *See also:* bearing. (PE) [9]

insulated bearing pedestal (rotating machinery) A bearing pedestal that is electrically insulated from its supporting structure to prevent the circulation of stray currents. *See also:* bearing. (PE) [9]

insulated bolt A bolt provided with insulation. (EEC/PE) [119]

insulated cap (separable insulated connectors) An accessory device designed to electrically insulate and shield and mechanically seal a bushing insert or integral bushing. (T&D/PE) 386-1995

insulated-case circuit breaker (ICCB) A circuit breaker that is assembled as an integral unit in a supporting and enclosing housing of insulating material and with a stored energy mechanism. (IA/PSP) 1015-1997

insulated conductor (1) A conductor covered with a dielectric (other than air) having a rated insulating strength equal to or greater than the voltage of the circuit in which it is used. (NESC/T&D) C2-1997, C2.2-1960

(2) A conductor encased within material of composition and thickness that is recognized by this Code as electrical insulation. (NESC/NEC) [86]

insulated coupling (rotating machinery) A coupling whose halves are insulated from each other to prevent the circulation of stray current between shafts. *See also:* rotor. (PE) [9]

insulated flange (piping) Element of a flange-type coupling, insulated to interrupt the electrically conducting path normally provided by metallic piping. *See also:* rotor. (PE) [9]

insulated-gate field-effect transistor (IGFET) (1) (metal-nitride-oxide field-effect transistor) A four-terminal device consisting of two separate areas of one conductivity type called source and drain with a terminal each, separated from each other by a substrate of opposite conductivity type with its terminal and straddled by an electrode with terminal called gate, which is insulated from the silicon by a layer of insulator material, frequently silicon dioxide, called gate. (ED) 581-1978w

(2) A field-effect transistor that has one or more gate electrodes that are electrically insulated from the channel. (ED) 1005-1998, 641-1987w

insulated-gate field-effect transistor symbols (metal-nitride-oxide field-effect transistor) IGFET types may be categorized as memory—nonmemory, enhancement mode—depletion mode, and *n*-channel−p-channel. Standard symbols for memory transistors do not exist. The diagram below presents the standard electrical symbols for the nonmemory transistors and the symbols used in this standard for memory transistors. The symbols used for the memory transistors must be considered provisional until specific standards have been finalized. (ED) 581-1978w

insulated ground stick An insulated rod, fabricated from fiberglass reinforced plastic, with specialized connection hardware, operating mechanism, and of sufficient length to allow for safe gripping and installation of grounding clamps. (T&D/PE) 524a-1993r

insulated image guide A planar dielectric waveguide composed of one or more dielectric strips of finite width affixed to an extended dielectric layer of lower dielectric constant and finite thickness, attached in turn to an extended conducting ground plane. (MTT) 1004-1987w

insulated joint (1) A coupling or joint used to insulate adjacent pieces of conduits, pipes, rods, or bars. (VT/CON/LT) 16-1955w

(2) (cable) A device that mechanically couples and electrically insulates the sheath and armor of contiguous lengths of cable. *See also:* tower. (T&D/PE) [10]

insulated-neutral terminal type voltage transformer One that has the neutral end of the primary winding insulated from the case or base and connected to a terminal that provides insulation for a lower voltage than required for the line terminal. (The neutral may be connected to the case or mounting base in a manner intended to facilitate temporary disconnection for dielectric testing.) (PE/TR) C57.13-1993

insulated parking bushing An accessory device designed to electrically insulate and shield and mechanically seal a power cable terminated with an elbow. (T&D/PE) 386-1995

insulated rail joint A joint used to insulate abutting rail ends electrically from one another. (EEC/PE) [119]

insulated splice (power cable joints) A splice with a dielectric medium applied over the connected conductors and adjacent cable insulation. (PE/IC) 404-1986s

insulated static wire An insulated conductor on a power transmission line whose primary function is protection of the transmission line from lightning and one of whose secondary function is communications. (PE) 599-1985w

insulated supply system *See:* ungrounded system.

insulated tool or device (A) (power line maintenance) A tool or device that has conductive parts and is either coated or covered with a dielectric material. **(B)** A tool or device designed primarily to provide insulation from an energized part or conductor. It can be composed entirely of insulating materials. *Examples:* conductor cover; stick; insulating tape. (T&D/PE) 458-1985, 516-1995

insulated turnbuckle An insulated turnbuckle is one so constructed as to constitute an insulator as well as a turnbuckle. *See also:* tower. (T&D/PE) [10]

insulating (covering of a conductor, or clothing, guards, rods, and other safety devices) A device that, when interposed between a person and current-carrying parts, protects the person making use of it against electric shock from the current-carrying parts with which the device is intended to be used: the opposite of conducting. *See also:* insulation; insulated. (T&D) C2.2-1960

insulating cell (rotating machinery) An insulating liner, usually to separate a coil-side from the grounded surface at a slot. *See also:* stator; rotor. (PE) [9]

insulating clothing Clothing made of natural or synthetic material that is designed primarily to provide insulation from an energized part or conductor. (T&D/PE) 516-1995

insulating envelope An envelope of inorganic or organic material such as a ceramic or cast resin placed around the energized conductor and insulating material. (PE/TR) C57.19.03-1996

insulating (isolating) joint (power cable joints) A cable joint which mechanically couples and electrically separates the sheath, shield, and armor on contiguous lengths of cable. (PE/IC) 404-1986s

insulating material (1) (rotating machinery) (insulant) A substance or body, the conductivity of which is zero or, in practice, very small. *See also:* asynchronous machine; direct-current commutating machine. (PE) [9], [84]

(2) A material that cannot conduct electricity under normal conditions. *Contrast:* conducting material; semiconducting material. (C) 610.10-1994w

insulating-material classifications For the purpose of establishing temperature limits, insulating materials shall be classified as follows:

Class 90. Materials or combinations of materials such as cotton, silk, and paper without impregnation. Other materials, or combinations of materials may be included in this class if, by experience or accepted tests, they can be shown to be capable of operation at 90°C.

Class 105. Materials or combinations of materials such as cotton, silk and paper when suitably impregnated or coated or when immersed in a dielectric liquid such as oil. Other materials or combinations of materials may be included in this class if, by experience or accepted tests, they can be shown to be capable of operation at 105°C.

Class 130. Materials or combinations of materials such as mica, glass fiber, asbestos, etc., with suitable bonding substances. Other materials or combinations of materials, not necessarily inorganic, may be included in this class if, by experience or accepted tests, they can be shown to be capable of operation at 130°C.

Class 155. Materials or combinations of materials such as mica, glass fiber, asbestos, etc., with suitable bonding substances. Other materials or combinations of materials, not necessarily inorganic, may be included in this class if, by experience or accepted tests, they can be shown to be capable of operation at 155°C.

Class 180. Materials or combinations of materials such as silicone elastomer, mica, glass fiber, asbestos, etc., with suitable bonding substances such as appropriate silicone resins. Other materials or combinations of materials may be included in this class if, by experience or accepted tests, they can be shown to be capable of operation at 180°C.

Class 220. Materials or combinations of materials that by experience or accepted tests can be shown to be capable of operation at 220°C.

Over Class 220. Insulation that consists entirely of mica, porcelain, glass, quartz, and similar inorganic materials. Other materials or combinations of materials may be included in this class if, by experience or accepted tests, they can be shown to be capable of operation at temperatures over 220°C.

Notes: 1. Insulation is considered to be *impregnated* when a suitable substance provides a bond between components of the structure and also a degree of filling and surface coverage sufficient to give adequate performance under the extremes of temperature, surface contamination (moisture, dirt, etc.), and mechanical stress expected in service. The impregnant shall not flow or deteriorate enough at operating temperature so as to seriously affect performance in service. 2. The electrical and mechanical properties of the insulation shall not be *impaired* by the prolonged application of the limiting insulation temperature permitted for the specific insulation class. The word impaired is used here in the sense of causing any change that could disqualify the insulating material for continuously performing its intended function, whether it is creepage, spacing, mechanical support, or dielectric barrier action. 3. In the above descriptions of insulating materials classifications, the words *accepted tests* refer to recognized test procedures established for the thermal evaluation of materials by themselves or in simple combinations. Experience or test data, used in classifying insulating materials, are distinct from the experience or test data derived for the use of materials in complete insulation systems. The thermal endurance of complete systems may be determined by test procedures specified by the responsible technical committees. A material that is classified as suitable for a given temperature in the above tabulation may be found suitable for a different temperature other than the given one, either higher or lower, by an insulation system test procedure. For example, it has been found that some materials suitable for operation at one temperature in air may be suitable for a higher temperature when used in a system operated in an inert gas atmosphere. 4. It is important to recognize that other characteristics, in addition to thermal endurance, such as mechanical strength, moisture resistance, and corona endurance, are required in varying degrees in different applications for the successful use of insulating materials. (SWG/PE) C37.40-1993

insulating member The part of the substation that isolates the energized conductor from a grounded member or other energized conductors. (SUB/PE) 1264-1993

insulating spacer Insulating material used to separate parts. *See also:* stator; rotor. (PE) [9]

insulating tape *See:* insulating tool.

insulating tool (A) (power line maintenance) A tool or device designed primarily to provide insulation from an energized part or conductor. It can be composed entirely of insulating materials. Examples: conductor cover; stick; insulating tape. **(B) (power line maintenance)** A tool or device that has conductive parts separated by dielectric parts. (T&D/PE) 516-1995

insulating transformer A transformer used to insulate one circuit from another. *See also:* specialty transformer. (PE/IA/TR/PC) C57.12.80-1978r, 463-1993w, [57]

insulation (1) (rotating machinery) (electric systems) Material or a combination of suitable nonconducting materials that provide electric isolation of two parts at different voltages. (PE) [9]

(2) (power cable joints) A material of suitable dielectric properties, capable of being field-applied, and used to provide and maintain continuity of insulation across the splice. The material need not be identical to the cable insulation, but should be electrically and physically compatible, including factor-molded insulating components that are field-installed. (PE/IC) 404-1986s

(3) (high-voltage switchgear) A material having the property of an insulator used to separate parts of the same or different potential. (SWG/PE) C37.40-1993, C37.100-1992

(4) (as applied to cable) That which is relied upon to insulate the conductor from other conductors or conducting parts or from ground. (NESC/T&D/PE) C2-1997, [10]

insulation breakdown (electrical insulation tests) A rupture of insulation that results in a substantial transient or steady increase in leakage current at the specified test voltage. (AES/ENSY) 135-1969w

insulation breakdown current (electrical insulation tests) The current delivered from the test apparatus when a dielectric breakdown occurs. (AES/ENSY) 135-1969w

insulation class (1) (grounding device) A number that defines the insulation levels of the device. (PE/SPD) 32-1972r

(2) Divided into classes according to the thermal endurance of the system for temperature rating purposes. NEMA classes of insulation systems used in motors include Classes A, B, F and H. These classes have been established in accordance with IEEE Std 1-1986 (Reaff 1992). Other classes of insulation are constantly being developed for such use. Insulation systems shall be classified as follows:

1) *NEMA Class A*. An insulation system (105°C temperature limit including a 40°C ambient or 65°C rise) that by experience or accepted test can be shown to have suitable thermal endurance when operating at the limiting Class A temperature specified in the temperature rise standard for the machine under consideration.
2) *NEMA Class B*. An insulation system (130°C temperature limit including a 40°C ambient or 90°C rise) that by experience or accepted test can be shown to have suitable thermal endurance when operating at the limiting Class B temperature specified in the temperature rise standard for the machine under consideration.
3) *NEMA Class F*. An insulation system (155°C temperature limit including a 40°C ambient or 115°C rise) that by experience or accepted test can be shown to have suitable thermal endurance when operating at the limiting Class F temperature specified in the temperature rise standard for the machine under consideration.
4) *NEMA Class H*. An insulation system (180 °C temperature limit including a 40°C ambient or 140°C rise) that by experience or accepted test can be shown to have suitable thermal endurance when operating at the limiting Class H temperature specified in the temperature rise standard for the machine under consideration.

(IA/PC) 1068-1996

(3) *See also:* insulation level. (PE/TR) C57.12.80-1978r

(4) (outdoor apparatus bushings) The voltage by which the bushing is identified and which designates the level on which the electrical performance requirements are based. (PE/TR) 21-1976, C57.12.80-19782r

insulation configuration The complete geometric configuration of the insulation, including all elements (insulating and con-

ducting) that influence its dielectric behavior. *See also:* phase-to-ground insulation configuration; longitudinal insulation configuration; phase-to-phase insulation configuration. (PE/C) 1313.1-1996

insulation coordination *See:* coordination of insulation.

insulation failure (1) The state of the insulation in which relevant physical, chemical, or electrical properties are altered sufficiently to cause operational failure or to jeopardize future failure-free operation under postulated conditions. (DEI/RE) 775-1993w

(2) (thyristor) The failure of a semiconductor or an insulator to support its rated voltage. *Synonym:* device breakdown. (IA/IPC) 428-1981w

insulation fault (surge arresters) Accidental reduction or disappearance of the insulation resistance between conductor and ground or between conductors. (PE) [8], [84]

insulation, graded *See:* graded insulation.

insulation level (1) (power and distribution transformers) An insulation strength expressed in terms of a withstand voltage. (PE/TR) C57.12.80-1978r

(2) The withstand values of the impulse and power frequency test voltages to ground, and where appropriate, between the phases, and between those parts where insulation is required. (PE/TR) C57.131-1995

(3) The combination of power frequency and impulse test voltage values that characterize the insulation of the capacitor bank with regard to its capability of withstanding the electric stresses between platform and earth, or between platform-mounted equipment and the platform. (T&D/PE) 824-1994

(4) A combination of voltage values (both power frequency and impulse) that characterize the insulation of an equipment with regard to its capability of withstanding dielectric stresses. (SPD/PE) C62.22-1997

insulation power factor (1) (rotating machinery) The ratio of dielectric loss in an insulation system to the applied apparent power, when measured at power frequency under designated conditions of voltage, temperature, and humidity. *Note:* Being the sine of an angle normally small, it is practically equal to loss tangent or dissipation factor, the tangent of the same angle. The angle is the complement of the angle whose cosine is the power factor. *See also:* loss tangent; asynchronous machine. (PE/TR) 21-1976, [9]

(2) (insulation) (outdoor apparatus bushings) The ratio of the power dissipated in the insulation, in watts, to the product of the effective voltage and current in voltamperes, when tested under a sinusoidal voltage and prescribed conditions. *Note:* The insulation power factor is equal to the cosine of the phase angle between the voltage and the resulting current when both the voltage and current are sinusoidal. (PE/TR) 21-1976, C57.19.03-1996, C57.12.80-1978r

insulation resistance (1) (aircraft, missile, and space equipment) The electrical resistance measured at specified direct-current potentials between any electrically insulated parts, such as a winding and other parts of the machine. (AES/ENSY) 135-1969w

(2) The capability of the electrical insulation of a winding to resist direct current. The quotient of applied direct voltage of negative polarity divided by current across machine insulation, corrected to 40°C, and taken at a specified time (t) from start of voltage application. The voltage application time is usually 1 min (IR_1) or 10 min (IR_{10}), however, other values can be used. Unit conventions: values of 1 through 10 are assumed to be in minutes, values of 15 and greater are assumed to be in seconds. (PE/EM) 43-2000

(3) The resistance, measured at a specified dc voltage, between any specified exposed conductive surface or line terminal (including ground) and one or more of the other line terminals of the device. (SPD/PE) C62.62-2000

insulation-resistance test A test for measuring the resistance of insulation under specified conditions. (PE) [9]

insulation-resistance versus voltage test (rotating machinery) A series of insulation-resistance measurements, made at increasing direct voltages applied at successive intervals and maintained for designated periods of time, with the object of detecting insulation system defects by departures of the measured characteristic from a typical form. Usually, this is a controlled overvoltage test. *See also:* asynchronous machine. (PE) [9]

insulation shielding (1) (power distribution) Conducting and/or semiconducting elements applied directly over and in intimate contact with the outer surface of the insulation. Its function is to eliminate ionizable voids at the surface of the insulation and confine the dielectric stress to the underlying insulation. (PE) [4]

(2) (cable systems) A nonmagnetic, metallic material applied over the insulation of the conductor or conductors, to confine the electric field of the cable to the insulation of the conductor or conductors. (PE/EDPG) 422-1977

(3) An envelope that encloses the insulation of a cable and provides an equipotential surface in contact with the cable insulation. (NESC) C2-1997

insulation sleeving (tubing) A varnish-treated or resin-coated flexible braided tube providing insulation when placed over conductors, usually at connections or crossovers. (PE) [9]

insulation slot separator (rotating machinery) Insulation member placed in a slot between individual coils, such as between main and auxiliary windings. *See also:* rotor; stator. (IA/APP) [90]

insulation system (1) (power and distribution transformers) An assembly of insulating materials in a particular type, and sometimes size, of equipment. (PE/TR) C57.12.80-1978r

(2) An assembly of insulation materials. For definition purposes, the insulation systems of synchronous machine windings (either field or armature) are divided into three components. These components are the coil insulation with its accessories, the connection and winding support insulation, and the associated structural parts. (REM) [115]

(3) *Class A.* A system utilizing materials having a preferred temperature index of 105 and operating at such temperature rises above stated ambient temperature as the equipment standard specifies based on experience or accepted test data. This system may alternatively contain materials of any class, provided that experience or a recognized system test procedure for the equipment has demonstrated equivalent life expectancy. The preferred temperature classification for a Class A insulation system is 105°C. *Class B.* A system utilizing materials having a preferred temperature index of 130 and operating at such temperature rises above stated ambient temperature as the equipment standard specifies based on experience or accepted test data. This system may alternatively contain materials of any class, provided that experience or a recognized system test procedure for the equipment has demonstrated equivalent life expectancy. The preferred temperature classification for a Class B insulation system is 130°C. *Class C.* A system utilizing materials having a preferred temperature index of over 240 and operating at such temperatures above stated ambient temperatures as the equipment standard specifies based on experience or accepted test data. This system may alternatively contain materials of any class, provided that experience or a recognized test procedure for the equipment has demonstrated equivalent life expectancy. The preferred temperature classification for a Class C insulation system is over 240°C. *Class F.* A system utilizing materials having a preferred temperature index of 155 and operating at such temperature rises above stated ambient temperatures as the equipment standard specifies based on experience or accepted test data. This system may alternatively contain materials of any class, provided that experience or a recognized test procedure for the equipment has demonstrated equivalent life expectancy. The preferred temperature classification for a Class F insulation system is 155°C. *Class H.* A system utilizing materials having a preferred temperature index of 180 and operating at such temperature rises above

stated ambient temperature as the equipment standard specifies based on experience or accepted test data. This system may alternatively contain materials of any class, provided that experience or a recognized test procedure for the equipment has demonstrated equivalent life expectancy. The preferred temperature classification for a Class H insulation system is 180°C. *Class N*. A system utilizing materials having a preferred temperature index of 200 and operating at such temperature rises above stated ambient temperatures as the equipment standard specifies based on experience or accepted test data. This system may alternatively contain materials of any class, provided that experience or a recognized test procedure for the equipment has demonstrated equivalent li fe expectancy. The preferred temperature classification for a Class N insulation system is 200°C. *Class R*. A system utilizing materials have a preferred temperature index of 220 and operating at such temperatures above stated ambient temperatures as the equipment standard specifies based on experience or accepted test data. This system may alternatively contain materials of any class, provided that experience or a recognized test procedure for the equipment has demonstrated equivalent life expectancy. The preferred temperature classification for a Class R insulation system is 220°C. *Class S*. A system utilizing materials having a preferred temperature index of 240 and operating at such temperatures above stated ambient temperatures as the equipment standard specifies based on experience or accepted test data. This system may alternatively contain materials of any class, provided that experience or a recognized test procedure for the equipment has demonstrated equivalent life expectancy. The preferred temperature classification for a Class S insulation system is 240°C.

(PE/EM) 117-1974r

(4) An assembly of one or more dielectric materials used in a functional mode in the design of an electrical component or equipment, including adjacent components that may influence aging. (DEI/RE) 775-1993w

(5) An assembly of insulating materials in association with the conductors and the supporting structural parts. All of the components described below that are associated with the stationary winding constitute one insulation system, and all of the components that are associated with the rotating winding constitute another insulation system.

— *Coil insulation with its accessories*. All of the insulating materials that envelop and separate the current-carrying conductors and their component turns and strands, and form the insulation between them and the machine structure; includes wire coating, varnish, encapsulants, slot insulation, slot fillers, tapes, phase insulation, polebody insulation, and retaining ring insulation when present.

— *Connection and winding support insulation*. All of the insulation materials that envelop the connections that carry current from coil to coil, and from stationary or rotating coil terminals to the points of external circuit attachment; and the insulation of any metallic supports for the winding.

— *Associated structural parts (insulation system)*. Items such as slot wedges, space blocks, and ties that are used to position the coil ends and connections; any nonmetallic supports for the winding; and field-coil flanges.

— *Insulation class*. Divided into classes according to the thermal endurance of the system for temperature rating purposes. NEMA classes of insulation systems used in motors include Classes A, B, F, and H. These classes have been established in accordance with IEEE Std 1-1986. Other classes of insulation are constantly being developed for such use.

Insulation systems shall be classified as follows:

1) *NEMA Class A*. An insulation system (105°C temperature limit including a 40°C ambient or 65°C rise) that by experience or accepted test can be shown to have suitable thermal endurance when operating at the limiting Class A temperature specified in the temperature rise standard for the machine under consideration.
2) *NEMA Class B*. An insulation system (130°C temperature limit including a 40°C ambient or 90°C rise) that by experience or accepted test can be shown to have suitable thermal endurance when operating at the limiting Class B temperature specified in the temperature rise standard for the machine under consideration.
3) *NEMA Class F*. An insulation system (155°C temperature limit including a 40°C ambient or 115°C rise) that by experience or accepted test can be shown to have suitable thermal endurance when operating at the limiting Class F temperature specified in the temperature rise standard for the machine under consideration.
4) *NEMA Class H*. An insulation system (180°C temperature limit including a 40°C ambient or 140°C rise) that by experience or accepted test can be shown to have suitable thermal endurance when operating at the limiting Class H temperature specified in the temperature rise standard for the machine under consideration.

(IA/PC) 1068-1996

(6) A system composed of solid insulating materials and insulating fluid. *Synonym:* system. (PE/TR) 1276-1997

(7) An assembly of insulating materials in a particular type of equipment. The class of the insulation system may be designated by letters, numbers, or other symbols. An insulation system class utilizes material having an appropriate temperature index and operates at such temperatures above stated ambient temperatures as the equipment standard specifies based on experience or accepted test data. The system may alternatively contain materials of any class, provided that experience or a recognized test procedure for the equipment has demonstrated equivalent life expectancy.

(IA/MT) 45-1998

insulation, thermal *See:* thermal insulation.

insulator (1) A device intended to give flexible or rigid support to electrical conductors or equipment and to insulate these conductors or equipment from ground or from other conductors or equipment. An insulator comprises one or more insulating parts to which connecting devices (metal fittings) are often permanently attached. (SWG/PE) C37.100-1981s

(2) Insulating material in a form designed to support a conductor physically and electrically separate it from another conductor or object. (NESC/T&D) C2-1997, C2.2-1960

(3) A device made of a material in which electrons or ions cannot be moved easily, hence preventing the flow of electric current. (C) 610.10-1994w

insulator arcing horn A metal part, usually shaped like a horn, placed at one or both ends of an insulator or of a string of insulators to establish an arcover path, thereby reducing or eliminating damage by arcover to the insulator or conductor or both. *See also:* tower. (T&D/PE) [10]

insulator arcing ring A metal part, usually circular or oval in shape, placed at one or both ends of an insulator or of a string of insulators to establish an arcover path, thereby reducing or eliminating damage by arcover to the insulator or conductor or both. *See also:* tower. (T&D/PE) [10]

insulator arcing shield (insulator grading shield) An arcing ring so shaped and located as to improve the voltage distribution across or along the insulator or insulator string. *See also:* tower. (T&D/PE) [10]

insulator arcover A discharge of power current in the form of an arc, following a surface discharge over an insulator. *See also:* tower. (T&D/PE) [10]

insulator cover Electrical protection equipment designed specifically to cover insulators. Examples: dead-end cover, pole-top cover, ridge-pin cover *Synonyms:* hood; pocketbook. *See also:* cover-up equipment. (T&D/PE) 516-1995

insulator grading shield *See:* insulator arcing shield.

insulator lifter A device designed to permit insulators to be lifted in a *string* to their intended position on a structure. *Synonyms:* insulator saddle; potty seat.

(T&D/PE) 524-1992r

insulator saddle *See:* insulator lifter.

insulator stack A rigid assembly of two or more switch and bus insulating units. *See also:* tower.
(PE/T&D/EEC/IEPL) [10], [89]

insulator string Two or more suspension insulators connected in series. *See also:* tower. (T&D/PE) [10]

insulator unit An insulator assembled with such metal parts as may be necessary for attaching it to other insulating units or device parts. (SWG/PE) C37.40-1993, C37.100-1992

inta *See:* integer array.

intake opening (rotating machinery) A port for the entrance of ventilation air. (PE) [9]

intake port (rotating machinery) An opening provided for the entrance of a fluid. (PE) [9]

integer (1) (microprocessor operating systems parameter types) A whole number that may be positive, negative, or zero and has a range of at least −32767 to +32767. The qualifier "long" is used to qualify the size the size of an integer. A long integer has a range of at least (−2**31 + 1) to (+2**31 − 1). (C/MM) 855-1985s

(2) (mathematics of computing) A positive or negative whole number, including zero. (C) 1084-1986w

integer adjectives (pulse terminology) The ordinal integers (that is, first, second, . . . *n*th, last) or the cardinal integers (that is, 1, 2, . . . *n*) may be used as adjectives to identify or distinguish between similar or identical features. The assignment of integer modifiers should be sequential as a function of time within a waveform epoch or within features thereof.
(IM/WM&A) 194-1977w

integer arithmetic Fixed-point arithmetic in which the radix point is assumed to lie immediately to the right of the least significant digit in each numeral; that is, all numbers are assumed to be integers. (C) 1084-1986w

integer array (inta) (subroutines for CAMAC) The symbol inta represents an integer array, the length and contents of which are not defined in this standard. It is intended to contain system-dependent or implementation-dependent information associated with the definition of a LAM. If no such information is required, the array need not be used. This information can include parameters necessary for interrupt linkage, event specification, etc. The documentation for an implementation must describe the requirements for any parameters contained in this array. *Synonym:* inta.
(NPS) 758-1979r

integer character string A decimal character string, an octal character string, or a hexadecimal character string.
(C/PA) 1387.2-1995

integer data Numeric data used to represent whole numbers; that is, numeric values without fractional parts. For example, 0, +1, −1, +2, −2, ... *See also:* zoned decimal data; fixed-point data; packed decimal data; unsigned packed decimal data. (C) 610.5-1990w

integer programming In operations research, a class of procedures for locating the maximum or minimum of a function under given constraints, one of which is that some or all variables must have integer values. *Synonym:* discrete programming. (C) 610.2-1987

integer type A data type whose members can assume only integer values and can be operated on only by integer arithmetic operations, such as addition, subtraction, and multiplication. *Contrast:* character type; enumeration type; real type; logical type. (C) 610.12-1990

integer unit A processing unit that performs integer and control-flow operations and contains general-purpose integer registers and processor state registers, as defined by this standard.
(C/MM) 1754-1994

integer variable A variable that may assume only integer (non-fractional) values. (C) 1084-1986w

integral action rate (proportional plus integral control action devices) (process control) For a step input, the ratio of the initial rate of change of output due to integral control action to the change in steady-state output due to proportional control action. *Note:* Integral action rate is often expressed as the number of repeats per minute because it is equal to the number of times per minute that the proportional response to a step input is repeated by the initial integral response.
(PE/EDPG) [3]

Integral Activity Group An Activity Group that is needed to complete project Activities, but is outside the management and development Activity Groups. (C/SE) 1074-1997

integral bushing An apparatus bushing designed for use with another connector component, such as an elbow.
(T&D/PE) 386-1995

integral control action (1) Control action in which the output is proportional to the time integral of the input. *See also:* control system, feedback.
(PE/IA/ICTL/PSE/IAC) 94-1970w, [60]

(2) Control action in which the output is proportional to the time integral of the input, that is the rate of change of output is proportional to the input. *Note:* In the practical embodiment of integral control action the relation between output and input, neglecting high frequency terms, is given by

$$\frac{Y}{X} = \pm \frac{I/s}{\frac{bI}{s} + 1} \quad 0 \le b \ll 1$$

where

b = reciprocal of static gain
$I/2\pi$ = gain cross-over frequency in cycles per unit time
s = complex variable
X = input transform
Y = output transform

(CS/PE/EDPG) [3]

(3) A control mode is designated to provide a controlled output proportional to the time integral of the input.
(PE/PSE) 94-1991w

integral coupling (rotating machinery) A coupling flange that is a part of a shaft and not a separate piece. *See also:* rotor.
(PE) [9]

integral-horsepower motor A motor built in a frame as large as or larger than that of a motor of open construction having a continuous rating of one horsepower at 1700−1800 revolutions per minute. *See also:* asynchronous machine.
(EEC/PE) [119]

integral nonlinearity (1) (A) (x-ray energy spectrometers) (of a pulse amplifying system) The maximum nonlinearity (deviation) over the specified operating range of a system, usually expressed as a percentage of the maximum of the specified range. **(B) (percent) (semiconductor radiation detectors)** The departure from linear response expressed as a percentage of the maximum rated output pulse amplitude.
(NPS/NID) 759-1984, 301-1976

(2) The maximum difference between the ideal and actual code transition levels after correcting for gain and offset.
(IM/WM&A) 1057-1994w

integral process A process that is needed to successfully complete project Activities, but is outside the management and development processes. The integral processes are verification and validation, software configuration management, documentation development, and training.
(C/SE) 1074.1-1995

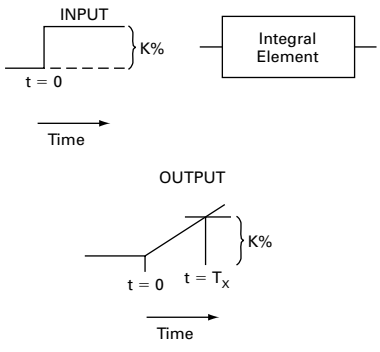
integral-slot winding (rotating machinery) A distributed winding in which the number of slots per pole per phase is an integer and is the same for all poles. *See also:* stator; rotor.
(PE) [9]

integral switch and fuse A switch and fuse assembly mounted on the same frame. (SWG/PE) C37.20.4-1996

integral test equipment *See:* self-test.

integral time (speed governing of hydraulic turbines) The integral time, T_X, of an integrating element is the time required for the element's percent output to be equal in magnitude to the element's percent input where that input is a step

function. The integral gain of an element is the reciprocal of its integral time.



integral time

(PE/EDPG) 125-1977s

integral unit substation A unit substation in which the incoming, transforming, and outgoing sections are manufactured as a single compact unit.

(SWG/PE/TR) C37.100-1992, C57.12.80-1978r

integrated (A) (germanium gamma-ray detectors) (pulse amplifier) (x-ray energy spectrometers) (charged-particle detectors) (pulse) A pulse is integrated when it is passed through a low-pass network, such as a single resistance-capacitance (RC) network or a cascaded RC network. **(B) (pulse) (pulse amplifier)** A pulse that is passed through a low-pass network, such as a single *RC* network or a cascaded *RC* network.

(NPS/NID) 759-1984, 325-1986, 300-1988

integrated alarm system (alarm monitoring and reporting systems for fossil-fueled power generating stations) An alarm display system consisting of window annunciators combined with cathode-ray tube (CRT), printer, or mimic display.

(PE/EDPG) 676-1986w

integrated antenna system A radiator with an active or nonlinear circuit element or network incorporated physically within the structure of the radiator. (AP/ANT) 145-1993

integrated circuit (IC) (solid state) A combination of interconnected circuit elements inseparably associated on or within a continuous substrate. *Note:* To further define the nature of an integrated circuit, additional modifiers may be prefixed. Examples are: 1) dielectric-isolated monolithic integrated circuit, 2) beamlead monolithic integrated circuit, 3) silicon-chip tantalum thin-film hybrid integrated circuit. *See also:* chip. (ED) 274-1966w, [46], 1005-1998 **(2) (A)** A combination of connected circuit elements (such as transistors, diodes, resistors, and capacitors) inseparably associated on or within a continuous substrate. **(B)** A solid-state circuit consisting of interconnected active and passive semiconductor devices diffused into a single silicon chip. *Synonyms:* chip; microcircuit. *See also:* monolithic integrated circuit; very-high-speed integrated circuit.

(ED/C) [46], 610.10-1994

Integrated Civil Engineering System (ICES) A general-purpose software system including several programming languages, such as COGO and STRUDL, and subsystems that are designed for use in civil engineering and engineering management. (C) 610.13-1993w

integrated data dictionary A data dictionary that is functionally involved in data accesses, performing required checks for value limits and data types and disallowing illegal modifications to data elements within the system that is described.

(C) 610.5-1990w

integrated database A repository for storing all information pertinent to the systems engineering process to include all data, schema, models, tools, technical management decisions, process analysis information, requirement changes, process and product metrics, and trade-offs. (C/SE) 1220-1998

integrated data package The evolving output of the systems engineering process that documents hardware, software, life cycle processes, and human engineering designs.

(C/SE) 1220-1998

integrated data processing (IDP) The use of computers to coordinate a number of processes and improve overall efficiency by reducing or eliminating redundant data entry or processing operations. (C) 610.2-1987

integrated demand (1) The demand integrated over a specified period divided by that period. (PE/PSE) 858-1993w **(2) (electric power utilization)** The demand integrated over a specified period. (PE/PSE) 346-1973w

integrated-demand meter (block-interval demand meter) A meter that indicates or records the demand obtained through integration. *See also:* demand meter; electricity meter.

(ELM) C12.1-1982s

integrated device electronics A data-transfer interface in which the control electronics for the disk drive are physically located on the drive itself rather than on an expansion board or drive adapter. *Synonym:* integrated drive electronics.

(C) 610.10-1994w

integrated diagnostics A process that covers the entire spectrum of diagnostic activities in all phases of weapon system acquisition. (ATLAS) 1226-1993s

integrated drive electronics *See:* integrated device electronics.

integrated electronics The portion of electronic art and technology in which the interdependence of material, device, circuit, and system-design consideration is especially significant: more specifically, that portion of the art dealing with integrated circuits. *See also:* integrated circuit.

(ED) 274-1966w, [46]

integrated energy curve (power operations) A curve of demand versus energy showing the amount of energy represented under a load curve, or a load duration curve, above any point of demand. *Synonym:* peak percent curve. *See also:* generating station. (PE/PSE) 858-1987s, 346-1973w

integrated heating system A complete system consisting of components such as pipelines, vessels, heating elements, heat transfer medium, thermal insulation, moisture barrier, nonheating leads, temperature controller, safety signs, junction boxes, conduit and fittings. (NESC/NEC) [86]

integrated injection logic A family of circuit logic in which the logic state is defined by current flow rather than by voltage level. (C) 610.10-1994w

integrated mica *See:* mica paper.

integrated microprocessor One or more large scale integration devices so interconnected as to provide all of the functions of a central processing unit within a single LSI circuit. *Note:* This use of the term is deprecated typically "microprocessor" is used. *See also:* horizontally integrated microprocessor; diagonally integrated microprocessor; vertically integrated microprocessor. (C) 610.10-1994w

integrated-numbering plan (telephone switching systems) In the world-numbering plan, arrangements for identifying telephone stations within a geographical area identified by a world-zone number which is also used as a country code. *See also:* world-zone number. (COM) 312-1977w

integrated numbering-plan area (telephone switching systems) A geographical area of the world that is identified by a world-zone number which is also used as a country code. *See also:* world-zone number. (COM) 312-1977w

integrated optical circuit (IOC) (fiber optics) An optical circuit, either monolithic or hybrid, composed of active and passive components, used for coupling between optoelectronic devices and providing signal processing functions.

(Std100) 812-1984w

integrated plow (static or vibratory plows) (cable plowing) A self-contained or integral plow-prime mover unit.

integrated precipitable water vapor The equivalent liquid water height (in centimeters) of a vertical column of water vapor

in the atmosphere with 1 cm^2 horizontal cross-section. (AP/PROP) 211-1997

integrated pulse In the absence of qualifiers (such as "true integration"), a pulse that has passed through one or more low-pass networks ("integrators"). (NPS) 325-1996

integrated radiation (laser maser) The integral of the radiance over the exposure duration. (LEO) 586-1980w

integrated services terminal equipment (ISTE) A device that serves as an information source and/or an information sink for the provision of voice, facsimile, video, data, and other information. (C/LM/COM) 802.9a-1995w, 8802-9-1996

integrating (block interval) demand meter (metering) A meter that integrates power or a related quantity over a fixed time interval, and indicates or records the average. (ELM) C12.1-1982s

integrating accelerometer A device that produces an output that is proportional to the time integral of an input acceleration. (AES/GYAC) 528-1994

integrating amplifier (1) (analog computer) An operational amplifier that produces an output signal equal to the time integral of a weighted sum of the input signals. *Note:* In an analog computer, the term integrator is synonymous with integrating amplifier. (C) 165-1977w, 166-1977w

(2) In an analog computer, an operational amplifier that produces an output signal equal to the time integral of a weighted sum of the input signals. (C) 610.10-1994w

integrating circuit *See:* integrator.

integrating motor In an analog computer, a motor designed to give a constant ratio of output shaft rotational speed to input signal. *Note:* The angle of rotation of the shaft with respect to a datum is thus proportional to the time integral of the applied signal. (C) 610.10-1994w

integrating network *See:* integrator.

integrating photometer (illuminating engineering) One which enables total luminous flux to be determined by a single measurement. The usual type is the Ulbricht sphere with associated photometric equipment for measuring the indirect illuminance of the inner surface of the sphere. (The measuring device is shielded from the source under measurement.) (EEC/IE) [126]

integrating preamplifier (germanium gamma-ray detectors) (x-ray energy spectrometers) A pulse preamplifier in which individual pulses are intentionally integrated by passive or active circuits. (NPS/NID) 325-1986s, 759-1984r

integrating relay A relay that operates on the energy stored from a long pulse or a series of pulses of the same or varying magnitude, for example, a thermal relay. *See also:* relay.

integration (1) (software) The process of combining software components, hardware components, or both into an overall system. (C) 610.12-1990

(2) The merger or combining of two or more lower-level elements into a functioning and unified higher-level element with the functional and physical interfaces satisfied. (C/SE) 1220-1994s

(3) Providing a single set of data for use between multiple activities or departments (multiple application data base). (PE/EDPG) 1150-1991w

(4) (of radar signals) The combination by addition (or the logical equivalent) of echo pulses or signal samples obtained by a radar as it illuminates a target so as to increase the output signal-to-noise ratio beyond that available from a single pulse or sample. (AES) 686-1997

(5) The service that enables delivery of medium access control (MAC) service data units (MSDUs) between the distribution system (DS) and an existing, non-IEEE 802.11 local area network (via a portal). (C/LM) 8802-11-1999

integration loss The loss incurred by integrating a signal noncoherently (postdetection) instead of coherently. (AES) 686-1997

integration test (1) The testing of several subsystems that perform in combination. (PE/SUB) 1378-1997

(2) (programmable digital computer systems in safety systems of nuclear power generating stations) Test(s) performed during the hardware-software integration process prior to computer system validation to verify compatibility of the software and the computer system hardware. 554-1990

integration testing (1) (software) Testing in which software components, hardware components, or both are combined and tested to evaluate the interaction between them. *See also:* component testing; unit testing; system testing; interface testing. (C) 610.12-1990

(2) An orderly progression of testing of incremental pieces of the software program in which software elements, hardware elements, or both are combined and tested until the entire system has been integrated to show compliance with the program design, and capabilities and requirements of the system. (C/SE) 1012-1998

integrator (1) (analog computer) A device producing an output proportional to the integral of one variable or of a sum of variables, with respect to another variable, usually time. *See also:* integrating amplifier. (C) 165-1977w

(2) (digital differential analyzer) A device using an accumulator for numerically accomplishing an approximation to the mathematical process of integration. (C) 162-1963w

(3) A functional unit whose output analog variable is the integral of an input analog variable with respect to time, or a variable other than time. *See also:* incremental integrator; storage integrator. (C) 610.10-1994w

(4) A device having an output proportional to the time integral of the input signal. (COM/TA) 1027-1996

(5) (as applied to relaying) A transducer whose output wave form is substantially the time integral of its input wave form. (SWG/PE) C37.100-1992

integrator, gain *See:* gain integrator.

integrity (1) (software) (data management) The degree to which a system or component prevents unauthorized access to, or modification of, computer programs or data. *See also:* database integrity; data integrity. (C) 610.5-1990w, 610.12-1990

(2) The condition of being unimpaired. (C/BA) 896.9-1994w

integrity check value (ICV) A value that is derived by performing an algorithmic transformation on the data unit for which data integrity services are provided. The ICV is sent with the protected data unit and is recalculated and compared by the receiver to detect data modification. (C/LM) 802.10-1998

INTELLECT A natural language front-end processor for an SQL database manipulation language. (C) 610.13-1993w

intellectual property An output of creative human thought process that has some intellectual or informational value. Intellectual property can be protected by patents, copyrights, trademarks, or trade secrets. (C/SE) 1420.1b-1999

intelligence bandwidth The sum of the audio- (or video-) frequency bandwidths of the one or more channels. (AP/ANT) 145-1983s

intelligent data model A data model that describes the logic, controls, and constraints that should be applied whenever the data are accessed. (C) 610.5-1990w

intelligent electronic device (IED) Any device incorporating one or more processors with the capability to receive or send data/control from or to an external source (e.g., electronic multifunction meters, digital relays, controllers). (SUB/PE) C37.1-1994

intelligent terminal A terminal that can send and receive information as well as perform some processing, such as making decisions or performing calculations, independent of the computer. *Synonym:* programmable terminal. *Contrast:* dumb terminal. *See also:* smart terminal. (C) 610.10-1994w

intended polarization The polarization of the radio wave for which an antenna system is designed. (AES) 686-1997

intensifier (non-real time spectrum analyzer) (baseline clipper) A means of changing the relative brightness between the signal and baseline portion of the display. (IM) [14]

intensifier electrode An electrode causing post acceleration. *See also:* electrode; post-accelerating (deflection) electrode. (ED) 161-1971w

intensity (1) (fiber optics) The square of the electric field amplitude of a light wave. Intensity is proportional to irradiance and may be used in place of the term "irradiance" when only relative values are important. *See also:* irradiance; radiant intensity; radiometry. (Std100) 812-1984w

(2) (oscilloscopes) A term used to designate brightness or luminance of the spot. *See also:* oscillograph. (IM/HFIM) [40]

intensity amplifier (oscilloscopes) An amplifier for signals controlling the intensity of the spot. *See also:* oscillograph. (IM/HFIM) [40]

intensity cueing *See:* depth cueing.

intensity (candlepower) distribution curve (illuminating engineering) A curve, often polar, that represents the variation of luminous intensity of a lamp or luminaire in a plane through the light center. *Note:* A vertical candlepower distribution curve is obtained by taking measurements at various angles of elevation in a vertical plane through the light center; unless the plane is specified, the vertical curve is assumed to represent an average such as would be obtained by rotating the lamp or luminaire about its vertical axis. A horizontal intensity distribution curve represents measurements made at various angles of azimuth in a horizontal plane through the light center. (EEC/IE) [126]

intensity level (specific sound-energy flux level) (sound-energy flux density level) In decibels, of a sound is 10 times the logarithm to the base 10 of the ratio of the intensity of this sound to the reference intensity. The reference intensity shall be stated explicitly. *Note:* In discussing sound measurements made with pressure or velocity microphones, especially in enclosures involving normal modes of vibration or in sound fields containing standing waves, caution must be observed in using the terms intensity and intensity level. Under such conditions it is more desirable to use the terms pressure level or velocity level since the relationship between the intensity and the pressure or velocity is generally unknown. (SP/ACO) [32]

intensity modulation (1) (general) The process, or effect, of varying the electron-beam current in a cathode-ray tube resulting in varying brightness or luminance of the trace. *See also:* television; oscillograph. (IM/HFIM) [40]

(2) (radar) A process used in certain displays whereby the luminance of the signal indication is a function of the received signal strength. (AES) 686-1997, [42]

intensity of magnetization *See:* magnetization.

intentional disconnect A primitive passed to the upper layers of both BCCs and DCCs to allow the device or system to recognize that an upcoming network disconnection is intentional. The method to trigger this primitive is left to the device or system designer. (EMB/MIB) 1073.3.1-1994

intentional radiator A device that intentionally generates and emits radio-frequency energy by radiation or induction. (EMC) C63.4-1991

interaction (nuclear power generating station) A direct or indirect effect of one device or system upon another. (PE/NP) 577-1976r

interaction-circuit phase velocity (traveling-wave tubes) The phase velocity of a wave traveling on the circuit in the absence of electron flow. *See also:* magnetron; electron device. (ED) [45]

interaction crosstalk coupling (between a disturbing and a disturbed circuit in any given section) The vector summation of all possible combinations of crosstalk coupling, within one arbitrary short length, between the disturbing circuit and all circuits other than the disturbed circuit (including phantom and ground-return circuits) with crosstalk coupling, within another arbitrary short length, between the disturbed circuit and all circuits other than the disturbing circuit. *See also:* coupling. (EEC/PE) [119]

interaction factor (1) (transducer) The factor in the equation for the received current that takes into consideration the effect of multiple reflections at its terminals. *Note:* For a transducer having a transfer constant θ, image impedances Z_{I_1} and Z_{I_2}, and terminating impedances Z_S and Z_R, this factor is

$$\frac{1}{1 - \dfrac{Z_{I_2} - Z_R}{Z_{I_2} + Z_R} \times \dfrac{Z_{I_1} - Z_S}{Z_{I_1} + Z_S} \times e^{-2\theta}}$$

(2) (electrothermic power meters) The ratio of power incident from an rf source to the power delivered by the source to a nonreflecting load: mathematically, $|1 - \Gamma_g|^2$ where Γ_g is the complex reflection coefficient of the source. (IM) 544-1975w

(3) A factor in the equation for the insertion voltage ratio that takes into account the impedance mismatch variation at one end of the network due to an impedance mismatch at the other end. The factor is written in terms of the source and load impedance, the image impedances and the image transfer function of the four-terminal network. (CAS) [13]

interaction gap An interaction space between electrodes. (ED) 161-1971w

interaction impedance (traveling-wave tubes) A measure of the radio-frequency field strength at the electron stream for a given power in the interaction circuit. It may be expressed by the following equation

$$K = \frac{E^2}{2(\omega/\nu)^2 P}$$

where E is the peak value of the electric field at the position of electron flow, ω is the angular frequency, ν is the interaction-circuit phase velocity, and P is the propagating power. If the field strength is not uniform over the beam, an effective interaction impedance may be defined. (ED) 161-1971w

interaction loss (transducer) The interaction loss expressed in decibels is 20 times the logarithm to base 10 of the scalar value of the reciprocal of the interaction factor. *See also:* attenuation.

interaction space (traveling-wave tubes) A region of an electron tube in which electrons interact with an alternating electromagnetic field. (ED) 161-1971w

interactive (1) (software) Pertaining to a system or mode of operation in which each user entry causes a response from or action by the system. *Contrast:* batch. *See also:* real time; conversational; online. (C) 610.2-1987, 610.12-1990, 610.10-1994w

(2) The behavior of a utility or control_script which requires input from the user during its execution. (C/PA) 1387.2-1995

interactive compiler *See:* incremental compiler.

interactive electrical systems Two or more interconnected and compatible electrical systems with appropriate protection and measuring provisions at their interconnection point(s). (SUB/PE) 1109-1990w

interactive graphics A method of operation of a computer graphics system where the graphics system requests and accepts input from a user then allows the user to dynamically control the processing operation. *Contrast:* passive graphics. (C) 610.6-1991w

interactive language A nonprocedural language in which a program is created as a result of interactive dialog between the user and the computer system. The system provides questions, forms, and so on, to aid the user in expressing the results to be achieved. *See also:* command language; declarative language; rule-based language. (C) 610.12-1990, 610.13-1993w

interactive plotting The use of a display device to view the output of a graphic or computational process. Applications

include computer-assisted instruction, computer-aided design, and control operations. (C) 610.2-1987

interactive shell A processing mode of the shell that is suitable for direct user interaction. (C/PA) 9945-2-1993

interblock gap An area between two consecutive blocks. *Synonyms:* record gap; block gap. (C) 610.5-1990w, 610.10-1994w

intercalated tapes (insulation) Two or more tapes, generally of different composition, applied simultaneously in such a manner that a portion of each tape overlies a portion of the other tape. (T&D/PE) [10]

intercardinal plane Any plane that contains the intersection of two successive cardinal planes and is at an intermediate angular position. *Note:* In practice, the intercardinal planes are located by dividing the angle between successive cardinal planes into equal parts. Often, it is sufficient to bisect the angle so that there is only one intercardinal plane between successive cardinal planes. (AP/ANT) 145-1993

intercarrier sound system A television receiving system in which use of the picture carrier and the associated sound-channel carrier produces an intermediate frequency equal to the difference between the two carrier frequencies. *Note:* This intermediate frequency is frequency modulated in accordance with the sound signal. *See also:* television. (EEC/PE) [119]

intercept call (telephone switching systems) A call to a line or an unassigned code that reaches an operator, a recorded announcement, or a vacant-code tone. (COM) 312-1977w

intercept trunk (telephone switching systems) A central office termination that may be reached by a call to a vacant number, changed number, or line out-of-order. (COM) 312-1977w

interchange Energy transferred from one power system to another. (PE/PSE) 858-1993w

interchangeable Said of two modules that, although possibly of different design, perform identical functions and have identical interface characteristics. (TT/C) 1149.5-1995

interchangeable bushing (outdoor apparatus bushings) A bushing designed for use in both power transformers and circuit breakers. (PE/TR) 21-1976

interchange circuit (data transmission) The length of cable used for signaling between the digital subset and the customer's equipment. (PE) 599-1985w

interchange energy (power operations) Energy delivered to or received by one electric system from another. (PE/PSE) 858-1987s, 346-1973w

interchannel interference (modulation systems) In a given channel, the interference resulting from signals in one or more other channels. (Std100) 270-1964w

intercharacter gap The space between the last bar of one character and the first bar of the next character which separates the two adjacent characters. (Also called intercharacter space). (PE/TR) C57.12.35-1996

intercharacter spacing In text formatting, the amount of space left between characters on a line. *Synonym:* letter spacing. *Contrast:* interword spacing. *See also:* kerning; incremental justification. (C) 610.2-1987

interclutter visibility The ability of a radar to detect moving targets that occur in resolution cells among patches of strong clutter; usually applied to moving-target indication (MTI) or pulsed-Doppler radars. *Note:* The higher the radar range and/or angle resolution, the better the interclutter visibility. (AES) 686-1997

intercom (interphone) The interference resulting from signals in one or more other channels. *See also:* intercommunicating system. (Std100) 270-1964w

intercommunicating system A privately owned two-way communication system without a central switchboard, usually limited to a single vehicle, building, or plant area. Stations may or may not be equipped to originate a call but can answer any call. *Synonyms:* intercom; interphone. (EEC/PE) [119]

interconnect (1) A collective term for structures (in an integrated circuit) that propagate a signal between the pins of cell instances with as little change as possible. These structures include metal and polysilicon segments, vias, fuses, antifuses, etc. Interconnect shall not include such structures if they occur as part of the fixed layout of a cell. (C/DA) 1481-1999

(2) The system of wiring that carries data and control signals between the different components mounted on a printed circuit assembly. *See also:* simple interconnect; extended interconnect; differential interconnect. (C/TT) 1149.4-1999

interconnected delta connection (power and distribution transformers) A three-phase connection using six windings (two per phase) connected in a six-sided circuit with six bushings to provide a fixed phase-shift between two three-phase circuits without change in voltage magnitude. *Note:* The interconnected delta connection is sometimes described as a "hexagon autotransformer," or a "squashed delta." (PE/TR) C57.12.80-1978r

interconnected star connection of polyphase circuits *See:* zigzag connection of polyphase circuits.

interconnected system (A) (electric power system) A system consisting of two or more individual power systems normally operating with connecting tie lines. *See also:* power system. **(B)** Two or more power systems connected by transmission facilities. (PE/PSE) 94-1970, [54], 94-1991

interconnecting channel (of a supervisory system) The transmission link, such as the direct wire, carrier, or microwave channel (including the direct current, tones, etc.) by which supervisory control or indication signals or selected telemeter readings are transmitted between the master station and the remote station or stations, in a single supervisory system. (SWG/PE) C37.100-1992

interconnection (1) The physical plant and equipment required to facilitate the transfer of electric energy between two or more entities. It can consist of a substation and an associated transmission line and communications facilities or only a simple electric power feeder. (SUB/PE) 1109-1990w

(2) The facilities that connect two power systems or control areas. (PE/PSE) 858-1993w

interconnection device *See:* adapter.

interconnection diagram (packaging machinery) A diagram showing the connections between the terminals in the control panel and outside points, such as connections to motors and auxiliary devices. (IA/PKG) 333-1980w

interconnection tie A feeder interconnecting two electric supply systems. *Note:* The normal flow of energy in such a feeder may be in either direction. *See also:* center of distribution. (T&D/PE) [10]

interconnect space The address space used for board identification, system configuration, and board specific functions such as testing and diagnostics. (C/MM) 1296-1987s

interconnect template A definition of the contents of the interconnect space of an agent. (C/MM) 1296-1987s

interdendritic corrosion Corrosive attack that progresses preferentially along interdendritic paths. *Note:* This type of attack results from local differences in composition, that is, coring, commonly encountered in alloy castings. (IA) [59]

interdigital magnetron A magnetron having axial anode segments around the cathode, alternate segments being connected together at one end, remaining segments connected together at the opposite end. (ED) 161-1971w, [45]

interdigital transducer (IDT) A comb-like conductive structure that is fabricated on the surface of a substrate and consists of interleaved metal electrodes (fingers) whose function is to transform electrical energy into acoustic energy or vice versa by means of the piezoelectric effect. (UFFC) 1037-1992w

interdigit interval (telephony) (dial-pulse address signaling systems) In dial-pulse signaling, an extended make interval used to separate and distinguish successive dial-pulse address digits. (COM/TA) 753-1983w

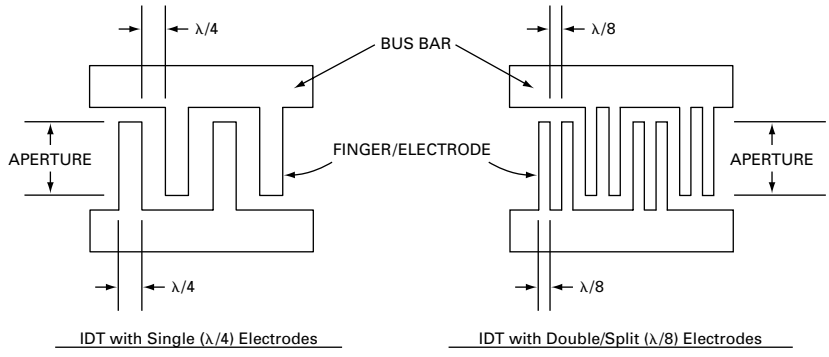


illustration of transducer parameters

interdigit (interdigital) time (measuring the performance of tone address signaling systems) The time interval between successive signal present intervals during which no signal present condition exists. This time includes the signal off condition and transition intervals between signal off condition and signal present condition on both state transitions. (COM/TA) 752-1986w

interelectrode capacitance (*j–I* interelectrode capacitance c_{jl} of an *n*-terminal electrode tube) The capacitance determined from the short-circuit transfer admittance between the *j*th and the *l*th terminals. *Note:* This quantity is often referred to as direct interelectrode capacitance. *See also:* electron-tube admittances. (ED) 161-1971w

interelectrode transadmittance (*j–I* interelectrode transadmittance of an *n*-electrode electron tube) The short-circuit transfer admittance from the *j*th electrode to the *l*th electrode. *See also:* electron-tube admittances. (ED) 161-1971w

interelectrode transconductance (*j–I* interelectrode transconductance) The real part of the *j–I* interelectrode transadmittance. *See also:* electron-tube admittances. (ED) 161-1971w

interelement influences (polyphase wattmeters) The percentage change in the recorded value that is caused solely by the action of the stray field of one element upon the other element. *Note:* This influence is determined at the specified frequency of calibration with rated current and rated voltage in phase on both elements or such lesser value of equal currents in both elements as gives end-scale deflection. Both current and voltage in one element shall then be reversed, and, for rating purposes, one-half the difference in the readings in percent is the interelement influence. *See also:* accuracy rating. (EEC/ERI/AII) [111], [102]

interexchange carrier In the United States, a common carrier limited by law to carry telephone traffic between local exchange and transport areas. (C) 610.7-1995

interexchange channel A direct channel or circuit between exchanges. (C) 610.7-1995

interface (1) (696 interface devices) A shared electrical boundary between parts of a computer system, through which information is conveyed. (C/MM) 696-1983w

(2) (microprocessor operating systems) A shared boundary between two layers or modules of software. (C/MM) 855-1985s

(3) (watthour meters) The means for transmitting information between the register and peripheral equipment. (ELM) C12.13-1985s

(4) (general) A shared boundary. (C) [20], [85]

(5) (Class 1E equipment and circuits) (nuclear power generating station) A junction or junctions between a Class 1E equipment and another equipment or device. (Examples: connection boxes, splices, terminal boards, electrical connections, grommets, gaskets, cables, conduits, enclosures, etc.) (PE/NP) 380-1975w, 323-1974s

(6) (programmable instrumentation) A common boundary between a considered system and another system, or between parts of a system, through which information is conveyed. (IM/AIN) 488.1-1987r

(7) (test, measurement, and diagnostic equipment) A shared boundary involving the specification of the interconnection between two equipments or systems. The specification includes the type, quantity and function of the interconnection circuits and the type and form of signals to be interchanged via those circuits. *See also:* adapter. (MIL) [2]

(8) (A) (data transmission) A common boundary; for example, a physical connection between two systems or two devices. The boundary may be mechanical such as the physical surfaces and spacings in mating parts, modules, components, or subsystems, or electrical, such as matching signal levels, impedances, or power levels of two or more subsystems. **(B) (data transmission)** A concept involving the specification of the interconnection between two equipments or systems. The specification includes the type, quantity, and function of the interconnection circuits and the type and form of signals to be interchanged by these circuits. (PE) 599-1985

(9) (A) (software) A shared boundary across which information is passed. **(B) (software)** A hardware or software component that connects two or more other components for the purpose of passing information from one to the other. **(C) (software)** To connect two or more components for the purpose of passing information from one to the other. **(D) (software)** To serve as a connecting or connected component as in definition (B). (C) 610.12-1990

(10) (STEbus) A shared boundary between two or more systems, or between two or more elements within a system, through which information is conveyed. (MM/C) 796-1983r, 1000-1987r

(11) (SBX bus) A shared boundary, between two systems or parts of systems, through which information is transferred. (C/MM) 959-1988r

(12) (electromechanical watthour meters) The means for communications between devices. (ELM) C12.15-1990

(13) A device placed between the line output of a digital telephone set and test equipment. The device performs at least one of the following functions: simulation of a normal network connection, control of the telephone set under test, or access for the reference codec to the digital voice signal. (COM/TA) 269-1992

(14) A junction or junctions between a Class 1E equipment and another equipment or device. (For motors, typical interfaces include, as applicable: mechanical mounting connection to the driven equipment and the motor mounting to its base, and force transmitted to the motor, electrical connection, cooling system connections, and lubrication system connection. *See also:* user interface; data-transfer interface. (PE/NP) 334-1994r

(15) (MULTIBUS) A shared boundary between modules or agents of a computer system, through which information is conveyed. (C/MM) 1296-1987s

(16) A shared boundary between two functional entities. A standard specifies the services in terms of the functional characteristics and behavior observed at the interface. The standard is a contract in the sense that it documents a mutual obligation between the service user and provider and assures a stable definition of that obligation. (C/PA) 14252-1996

(17) Hardware or software that provides a point of communication between two or more processes, persons, or other physical entities. (C) 610.7-1995, 610.10-1994w

(18) A shared boundary between two objects such as devices, systems, or networks, across which information is passed. *See also:* user interface; data-transfer interface. (SUB/PE/C) 999-1992w, 610.10-1994w

(19) Either the MA interface or the MT interface without distinction, or one of the two in particular. (C/PA) 1224.1-1993w

(20) A junction or junctions between a Class 1E equipment and another equipment or device. (For motors, typical interfaces include, as applicable: mechanical mounting connection to the driven equipment and the motor mounting to its base, any force transmitted to the motor, electrical connection, cooling system connections, and lubrication system connection.) (PE/NP) 334-1994r

(21) In software development, a relationship among two or more entities (such as software item - software item, software item - hardware item, software item - user, or software unit - software unit) in which the entities share, provide, or exchange data. An interface is not a software item, software unit, or other system component; it is a relationship among them. (C/SE) J-STD-016-1995

(22) A shared boundary between two layers or modules of software. (C/MM) 855-1990

(23) A shared boundary that specifies the interconnection between two units or systems, hardware or software. In hardware, the specification includes the type, quantity, and function of the interconnection circuits and the type and form of signals to be interchanged via those circuits. In software, the specification includes the object type and, where necessary, the name or instance handle of specific objects copied or shared between the two systems. (SCC20) 1226-1998

(24) The declaration of the meaning and the signature for a property or constraint. The interface states "what" a property (responsibility) knows or does or what a constraint (responsibility) must adhere to. The interface specification consists of the meaning (semantics) and the signature (syntax) of a property or constraint. (C/SE) 1320.2-1998

interface-CCITT (data transmission) The present European, and possible world standard, for interface requirements between data processing terminal equipment and data communication equipment. The CCITT standard resembles very closely the American EIA, Standard RS-232-C. This standard is considered mandatory in Europe and on the other continents. (PE) 599-1985w

interface control (1) (software, configuration management) The process of identifying all functional and physical characteristics relevant to the interfacing of two or more configuration items provided by one or more organizations, and ensuring that proposed changes to these characteristics are evaluated and approved prior to implementation. *See also:* configuration status accounting; configuration identification; configuration control; configuration audit; configuration management; configuration item; software library; baseline; configuration control board. (C/SE) 828-1983s, 610.12-1990

(2) (software) (DoD usage) In configuration management, the administrative and technical procedures and documentation necessary to identify functional and physical characteristics between and within configuration items provided by different developers, and to resolve problems concerning the specified interfaces. *See also:* configuration control. (C) 610.12-1990

Interface Definition Language (IDL) (1) A machine-compilable language used to describe interfaces that clients call and implementations provide. IDL provides a neutral way to define an interface. [IDL is an Object Management Group (OMG) product.] (SCC20) 1226-1998

(2) A programming language-independent method of specifying operation syntax. (IM/ST) 1451.1-1999

interface design document (IDD) Documentation that describes the architecture and design of interfaces between system and components. These descriptions include control algorithms, protocols, data contents and formats, and performance. (C/SE) 1012-1998

interface device *See:* adapter.

interface error An error condition caused by hardware incompatibility, software incompatibility or other incompabilities between any two items of equipment. (C) 610.10-1994w

Interface Only Implementation Refers to the implementation of an operation on an Object. This means that only the interface properties of the operation are implemented. The operation will return an appropriate error code but otherwise have no other effect on the Object. (IM/ST) 1451.1-1999

interface, operating *See:* operating interface.

interface operation *See:* operation.

interface plane An assigned plane on the bottom surface of the module connector from which the connector's electrical pins protrude, thus forming the mating surface. This surface is used as a reference for module dimensions. (C/BA) 1101.3-1993

interface requirement (software) A requirement that specifies an external item with which a system or system component must interact, or that sets forth constraints on formats, timing, or other factors caused by such an interaction. *Contrast:* physical requirement; performance requirement; functional requirement; design requirement; implementation requirement. (C) 610.12-1990

interface requirement specification (IRS) Documentation that specifies requirements for interfaces between systems or components. These requirements include constraints on formats and timing. (C/SE) 1012-1998

interface specification (1) (software) A document that specifies the interface characteristics of an existing or planned system or component. (C) 610.12-1990

(2) The description of essential functional, performance, and design requirements and constraints at a common boundary between two or more system elements. This includes interfaces between humans and hardware or software, as well as interfaces between humans themselves. (C/SE) 1220-1998

interface system (1) (696 interface devices) (general system term) The device independent functional, electrical, and mechanical elements of an interface necessary to effect unambiguous communication among a set of devices. Driver and receiver circuits, signal line descriptions, timing and control conventions, data transfer protocols, and functional logic circuits are typical system elements. (MM/C) 696-1983w

(2) (general system) (microcomputer system bus) The device-dependent electrical and functional interface elements necessary for communication between devices. Typical elements are: driver and receiver circuits and functional logic circuits. (MM/C) 796-1983r

(3) (STEbus) The device-independent electrical, mechanical, and functional interface elements required for unambiguous communication between two or more devices. Typical elements include

- driver and receiver circuitry
- signal line descriptions
- timing and control conventions
- communication protocols
- functional logic circuits.

(MM/C) 1000-1987r

(4) (programmable instrumentation) The device-independent mechanical, electrical, and functional elements of an

interface necessary to effect communication among a set of devices. Cables, connector, driver and receiver circuits, signal line descriptions, timing and control conventions, and functional logic circuits are typical interface system elements. (IM/AIN) 488.1-1987r

interface test A test to check interaction among equipment through permanent interconnections. (SUB/PE) 1303-1994

interface test adapter (1) A device or series of devices designed to provide a compatible connection between the unit under test (UUT) and the test equipment. May include proper stimuli or loads not contained in the test equipment. (ATLAS) 1232-1995

(2) *See also:* adapter. (SCC20) 1226-1998

interface testing (software) Testing conducted to evaluate whether systems or components pass data and control correctly to one another. *See also:* system testing; component testing; unit testing; integration testing. (C) 610.12-1990

interfacial connection (soldered connections) A conductor that connects conductive patterns on opposite sides of the base material. (EEC/AWM) [105]

interference (1) (electric-power-system measurements) Any spurious voltage or current appearing in the circuits of the instrument. *Note:* The source of each type of interference may be within the instrument case or external. The instrument design should be such that the effects of interference arising internally are negligible. (EEC/EMI) [112]

(2) (induction or dielectric-heating usage) The disturbance of any electric circuit carrying intelligence caused by the transfer of energy from induction- or dielectric-heating equipment. (IA) 54-1955w, 169-1955w

(3) (fiber optics) In optics, the interaction of two or more beams of coherent or partially coherent light. *See also:* coherent; diffraction; degree of coherence. (Std100) 812-1984w

(4) (overhead-power-line corona and radio noise) Impairment to a useful signal produced by natural or man-made sources. *Note:* Distortions caused by reflections, shielding, or extraneous power in a signal's frequency range are all examples of interference. *Synonym:* radio interference. (T&D/PE) 539-1979s

(5) Field strength produced by a radio disturbance, such as signals from other stations. (T&D/PE) 1260-1996

(6) (data transmission) In a signal transmission path, either extraneous power which tends to interfere with the reception of the desired signals or the disturbance of signal which results. (PE) 599-1985w

interference, common-mode *See:* common-mode interference.

interference coupling ratio (signal-transmission system) The ratio of the interference produced in a signal circuit to the actual strength of the interfering source (in the same units). *See also:* interference. (IE) [43]

interference, differential-mode *See:* differential-mode interference.

interference field strength Field strength produced by a radio disturbance. *Note:* Such a field strength has only a precise value when measured under specified conditions. Normally, it should be measured according to publications of the International Special Committee on Radio Interference. *See also:* electromagnetic compatibility. (EMC/INT) [53], [70]

interference filter (fiber optics) An optical filter consisting of one or more thin layers of dielectric or metallic material. *See also:* optical filter; interference; dichroic filter. (Std100) 812-1984w

interference guard bands The two bands of frequencies additional to, and on either side of, the communication band and frequency tolerance, which may be provided in order to minimize the possibility of interference. *See also:* channel. (AP/ANT) 145-1983s

interference, longitudinal *See:* common-mode interference.

interference measurement (induction or dielectric-heating usage) A measurement usually of field intensity to evaluate the probability of interference with sensitive receiving apparatus. *See also:* induction heating. (IA) 54-1955w

interference, normal-mode *See:* normal-mode interference.

interference pattern The resulting space distribution when progressive waves of the same frequency and kind are superposed. *See also:* wavefront. (EEC/PE) [119]

interference power Power produced by a radio disturbance. *Note:* Such a power has only a precise value when measured under specified conditions. *See also:* electromagnetic compatibility. (EMC/INT) [53], [70]

interference, series-mode *See:* differential-mode interference.

interference susceptibility (mobile communication) A measure of the capability of a system to withstand the effects of spurious signals and noise that tend to interfere with reception of the desired intelligence. *See also:* mobile communication system. (VT) [37]

interference testing (test, measurement, and diagnostic equipment) A type of on-line testing that requires disruption of the normal operation of the unit under test. *See also:* noninterference testing. (MIL) [2]

interference-test input (amplitude-modulation broadcast receivers) The least interfering-signal or signal field, of specified carrier frequency, which results in interference test output. It is expressed in decibels below one volt, or in microvolts, or in the case of loop measurements in decibels below one volt per meter or microvolts per meter. (CE) 186-1948w

interference-test output (amplitude-modulation broadcast receivers) Output that is 30 dB less than, or 0.001 of the power of, the normal test output. (CE) 186-1948w

interference, transverse *See:* differential-mode interference.

interference voltage Voltage produced by a radio disturbance. *Note:* Such a voltage has a precise value only when measured under specified conditions. Normally, it should be measured according to recommendations of the International Special Committee on Radio Interference. *See also:* electromagnetic compatibility. (EMC/INT) [53], [70]

interferometer (1) (fiber optics) An instrument that employs the interference of light waves for purposes of measurement. *See also:* interference. (Std100) 812-1984w

(2) An antenna and receiving system that determines the angle of arrival of a wave by phase comparison of the signals received at widely separated antennas. *Note:* In radar, the angle measurement made by an interferometer is generally ambiguous, and means must be used to resolve the ambiguities. (AES) 686-1997

interferometer antenna An array antenna in which the interelement spacings are large compared to wavelength and element size so as to produce grating lobes. (AP/ANT) 145-1993

interflectance method† **(illuminating engineering)** A lighting design procedure for predetermining the luminances of walls, ceiling, and floor and the average illuminance on the workplane based on integral equations. It takes into account both direct and reflected flux. (This term is retained for reference and literature searches.) (EEC/IE) [126]

† Obsolete.

interflected component (illuminating engineering) That portion of luminous flux from a luminaire which arrives at the work-plane after being reflected one or more times from room surfaces, as determined by the flux transfer theory. *See also:* flux transfer theory. (EEC/IE) [126]

interflection (illuminating engineering) The multiple reflection of light by the various room surfaces before it reaches the work-plane or other specified surface of a room. *Synonym:* interreflection. (EEC/IE) [126]

interframe coding An image compression technique in which a sequence of images is compressed by taking advantage of redundancies between successive images. (C) 610.4-1990w

intergranular corrosion Corrosion that occurs preferentially at grain boundaries. (IA) [59]

interior The set of pixels in a region of a digital image that are not adjacent to pixels in the region's complement. *Contrast:* border. (C) 610.4-1990w

interior communication systems (marine) Those systems providing audible or visual signals or transmission of information within or on a vessel. (PE/EEC) [119]

interior wiring system ground A ground connection to one of the current-carrying conductors of an interior wiring system. *See also:* ground. (T&D/PE) [10]

interlaboratory standards Those standards that are used for comparing reference standards of one laboratory with those of another, when the reference standards are of such nature that they should not be shipped. *See also:* measurement system. (IM) 285-1968w, [38]

interlace (A) To arrange, access, select, or display in an alternating fashion. **(B)** To refresh a display device using two passes of the writing beam to complete the full display; the first pass draws every other line and the second fills in those skipped. (C) 610.10-1994

interlaced Pertaining to a display device in which every other line of pixels is refreshed on each pass. *Contrast:* noninterlaced. (C) 610.10-1994w

interlace factor (television) A measure of the degree of interlace of nominally interlaced fields. *Note:* In a two-to-one interlaced raster, the interlace factor is the ratio of the smaller of two distances between the centers of adjacent scanned lines to one-half the distance between the centers of sequentially scanned lines at a specified point. (BT/AV) 201-1979w

interlace scan A raster scan technique in which the electron beam alternately refreshes all even, then all odd, scan lines of a display surface. (C) 610.6-1991w

interlaced scanning (television) A scanning process in which the distance from center to center of successively scanned lines is two or more times the nominal line width, and in which the adjacent lines belong to different fields. *See also:* television. (BT/AV) [34]

interlacing impedance voltage of a Scott-connected transformer (power and distribution transformers) The interlacing impedance voltage of Scott-connected transformers is the single-phase voltage applied from the midtap of the main transformer winding to both ends, connected together, which is sufficient to circulate in the supply lines a current equal to the rated three-phase line current. The current in each half of the winding is 50% of this value. The per-unit or percent interlacing resistance is the measured watts expressed on the base of the rated kVA of the teaser winding. The per-unit or percent interlacing impedance is the measured voltage expressed on the base of the teaser-voltage. (PE/TR) C57.12.80-1978r

interLATA In the United States, a collection of circuits that cross local access and transport area boundaries and are passed onto an interexchange carrier. *See also:* intraLATA. (C) 610.7-1995

interleave (1) To arrange parts of one sequence of things or events so that they alternate with parts of one or more other sequences of things or events and so that each sequence retains its identity. (C/C) [20], [85]

(2) (software) To alternate the elements of one sequence with the elements of one or more other sequences so that each sequence retains its identity; for example, to alternately perform the steps of two different tasks in order to achieve concurrent operation of the tasks. (C) 610.12-1990

(3) To arrange parts of one sequence of things or events so that they alternate with parts of one or more other sequences of the same nature such that each sequence retains its identity; For example, to assign successive addresses to physically separated storage locations in such a way as to reduce access time. (C) 610.10-1994w

interleaved array In PL/1, an array whose name refers to noncontiguous storage. (C) 610.5-1990w

interleaved memory A type of memory in which two or more separate arrays are used to fill alternate accesses in such a way as to speed the average access time of the memory. For example, the odd addresses are all in one memory array and the even addresses are in a second. (C) 610.10-1994w

interleaved windings (power and distribution transformers) (of a transformer) An arrangement of transformer windings where the the primary and secondary windings, and the tertiary windings, if any, are subdivided into disks (or pancakes) or layers and interleaved on the same core. (PE/TR) C57.12.80-1978r

interleaving The process of alternating two or more operations or functions through the overlapped use of a computer facility. *See also:* interleaved memory. (C) 610.10-1994w

interlock (1) A device actuated by the operation of some other device with which it is directly associated, to govern succeeding operations of the same or allied devices. *Note:* An interlock system is a series of interlocks applied to associated equipment in such a manner as to prevent or allow operation of the equipment only in a prearranged sequence. Interlocks are classified into three main divisions: mechanical interlocks, electrical interlocks, and key interlocks, based on the type of interconnection between the associated devices. (SWG/PE/TR) C37.100-1992, C57.12.80-1978r

(2) To prevent one device from interfering with another. For example, to lock the switches to prevent manual movement of the switches while a program is executing. (C) 610.10-1994w

(3) Device that permits equipment or controls to operate only after other conditions have been fulfilled. (PE/EDPG) 1020-1988r

interlock bypass A command to temporarily circumvent a normally provided interlock. (IA/EEC) [61], [74]

interlocked sequence A fixed sequence of events in which one event in the sequence must occur before the next event may occur. (IM/AIN) 488.1-1987r

interlocking (1) (interlocking plant) (railways) An arrangement of apparatus in which various devices for controlling track switches, signals, and related appliances are so interconnected that their movements must succeed one another in a predetermined order, and for which interlocking rules are in effect. *Note:* It may be operated manually or automatically. (PE/EEC) [119]

(2) An arrangement of switch, lock, and signal devices that is located where rail tracks cross, join, separate, and so on. The devices are interconnected in such a way that their movements must succeed each other in a predefined order, thereby preventing opposing or conflicting train movements. (VT/RT) 1474.1-1999

interlocking deactivating means (defeater) A manually actuated provision for temporarily rendering an interlocking device ineffective, thus permitting an operation that would otherwise be prevented. For example, when applied to apparatus such as combination controllers or control centers, it refers to voiding of the mechanical interlocking mechanism between the externally operable disconnect device and the enclosure doors to permit entry into the enclosure while the disconnect device is closed. *See also:* electric controller. (IA/ICTL/IAC) [60]

interlocking limits (interlocking territory) (railways) An expression used to designate the trackage between the opposing home signals of an interlocking. *See also:* interlocking. (PE/EEC) [119]

interlocking machine (railways) An assemblage of manually operated levers or equivalent devices, for the control of signals, switches, or other units, and including mechanical or circuit locking, or both, to establish proper sequence of movements. *See also:* interlocking. (PE/EEC) [119]

interlocking plant *See:* interlocking.

interlocking relay (railways) A relay that has two independent magnetic circuits with their respective armatures so arranged that the dropping away of either armature prevents the other

armature from dropping away to its full stroke. (EEC/PE) [119]

interlocking signals (railways) The fixed signals of an interlocking. (PE/EEC) [119]

interlocking station (railways) A place from which an interlocking is operated. (EEC/PE) [119]

interlocking territory *See:* interlocking limits.

interlock relay A relay with two or more armatures having a mechanical linkage, or an electric interconnection, or both, whereby the position of one armature permits, prevents, or causes motion of another armature. *See also:* relay. (EEC/REE) [87]

intermateability The capability for units of equipment to fit together mechanically but not necessarily work together electrically. (C/BA) 14536-1995

intermateable Mechanical compatibility between modules with the backplane, card cage, and system into which they are inserted. Sometimes includes compatibility in the assignment of power and ground pins. (C/BA) 896.2-1991w, 896.10-1997

intermediate contacts (of a switching device) Contacts in the main circuit that part after the main contacts and before the arcing contacts have parted. (SWG/PE/TR) C37.100-1992, C57.12.44-1994

intermediate current ratings (of distribution fuse links) A series of distribution fuse-link ratings chosen from a series of preferred numbers that are spaced between the preferred current ratings, but may not provide coordination therewith. Coordination between adjacent intermediate ratings may be secured to the same degree as between adjacent preferred current ratings. (SWG/PE) C37.40-1993

intermediate datatype Any of the basic datatypes in terms of which the other, substantive datatypes of the interface are defined. (C/PA) 1328-1993w, 1327-1993w, 1224-1993w

intermediate distributing frame (telephone switching systems) A frame where crossconnections are made only between units of central office equipment. (COM) 312-1977w

intermediate frequency (IF) (1) (A) (nonlinear, active, and nonreciprocal waveguide components) (general). A frequency to which a signal wave is shifted locally as an intermediate step in transmission or reception. **(B) (nonlinear, active, and nonreciprocal waveguide components)** (superheterodyne reception). The difference frequency resulting from a frequency conversion before demodulation. (MTT/PE) 457-1982, 599-1985, 188-1952

(2) (overhead-power-line corona and radio noise) The frequency resulting from a frequency conversion that is amplified locally in the receiver before demodulation. (T&D/PE) 539-1990

intermediate-frequency-harmonic interference (superheterodyne receivers) Interference due to radio-frequency-circuit acceptance of harmonics of an intermediate-frequency signal. 188-1952w

intermediate-frequency interference ratio *See:* radio receiver; intermediate-frequency response ratio.

intermediate-frequency response ratio (superheterodyne receivers) The ratio of the field strength at a specified frequency in the intermediate frequency band to the field strength at the desired frequency, each field being applied in turn, under specified conditions, to produce equal outputs. *See also:* radio receiver. 188-1952w

intermediate-frequency transformer A transformer used in the intermediate-frequency portion of a heterodyne system. *Note:* Intermediate-frequency transformers are frequently narrow-band devices. (CHM) [51]

intermediate hub (IH) A hub that occupies any level below the header hub in a hierarchy of hubs. *Note:* This term is contextually specific to IEEE Std 802.3, clause 12. (LM/C) 610.7-1995, 802.3-1998

intermediate layer (solar cells) The material on the solar cell surface that provides improved spectral match between the cell and the medium in contact with this surface. (AES/SS) 307-1969w

intermediate macro Any of the basic macros in terms of which the other, substantive macros used to realize the dispatcher are defined. (C/PA) 1328-1993w, 1327-1993w

intermediate maintenance (test, measurement, and diagnostic equipment) Maintenance which is the responsibility of and performed by designated maintenance activities for direct support of using organizations. Its phases normally consist of calibration, repair or replacement of damaged or unserviceable parts, components or assemblies: the emergency manufacture of nonavailable parts and providing technical assistance to using organizations. (MIL) [2]

intermediate means (measurement sequence) All system elements that are used to perform necessary and distinct operations in the measurement sequence between the primary detector and the end device. *Note:* The intermediate means, where necessary, adapts the operational results of the primary detector to the input requirements of the end device. *See also:* measurement system. (EEC/EMI) [112]

intermediate metal conduit A metal raceway of circular cross section with integral or associated couplings, connectors and fittings approved for the installation of electrical conductors. (NESC/NEC) [86]

intermediate office (telephone switching systems) A switching entity where trunks are terminated for purposes of interconnection to other offices. (COM) 312-1977w

intermediate product *See:* partial product.

intermediate repeater (data transmission) A repeater for use in a trunk of line at a point other than an end. (PE) 599-1985w

intermediate subcarrier A carrier that may be modulated by one or more subcarriers and that is used as a modulating wave to modulate a carrier or another intermediate subcarrier. *See also:* carrier; subcarrier. (AP/ANT) 145-1983s

intermediate system In OSI context, an open system that performs a relay function that is neither the data source nor the data sink for a given instance of communication. (C) 610.7-1995

intermediate test result code A test result code, obtained from an assertion test, that requires further processing to determine the final test result code. (C/PA) 2003-1997

intermediate-voltage power supply (IVPS) Power supply that converts the third rail or catenary high-voltage dc or ac into an intermediate-voltage ac or dc to feed other power supplies. (VT) 1476-2000

intermittent duty (1) (rotating machinery) A duty in which the load changes regularly or irregularly with time. *See also:* asynchronous machine; voltage regulator; direct-current commutating machine. (PE) [9]

(2) Operation for alternate intervals of load and no load; or load and rest; or load, no load and rest. (NESC/NEC) [86]

(3) A requirement of service that demands operation for alternate periods of current loading and rest, such alternate intervals being definitely specified. (PE/TR) C57.16-1996

(4) A requirement of service that demands operation for alternate periods (1) load and no load; or (2) load and rest; or (3) load, no load and rest, as specified. (IA/MT) 45-1998

intermittent-duty rating The specified output rating of a device when operated for specified intervals of time other than continuous duty. (AP/ANT) 145-1983s

intermittent failure *See:* failure.

intermittent fault (1) (surge arresters) A fault that recurs in the same place and due to the same cause within a short period of time. (PE) [8], [84]

(2) (software) A temporary or unpredictable fault in a component. *See also:* transient error; random failure. (C/BA) 896.9-1994w, 610.12-1990

(3) A recurring temporary error caused by component degradation or inadequate design (e.g. noise margin). (C/BA) 896.3-1993w

intermittent inductive train control Intermittent train control in which the impulses are communicated to the vehicle-carried apparatus inductively. *See also:* automatic train control. (EEC/PE) [119]

intermittent rating *See:* periodic rating.

intermittent test (batteries) A service test in which the battery is subjected to alternate discharges and periods of recuperation according to a specified program until the cutoff voltage is reached. *See also:* battery. (PE/EEC) [119]

intermittent train control A system of automatic train control in which impulses are communicated to the locomotive or vehicle at fixed points only. *See also:* intermittent inductive train control; automatic train control. (EEC/PE) [119]

intermodal distortion *See:* multimode distortion.

intermodulation (nonlinear transducer element) The modulation of the components of a complex wave by each other, as a result of which waves are produced that have frequencies equal to the sums and differences of integral multiples of those of the components of the original complex wave. *See also:* modulation. (AP/ANT) [53], 145-1983s

intermodulation distortion (IMD) (1) (data transmission) Nonlinear distortion of a system or transducer, characterized by the appearance in the output of frequencies equal to the sums and differences of integral multiples of the two or more component frequencies present in the input wave. Harmonic components also present in the output are usually not included as part of the intermodulation distortion. When harmonics are included, a statement to that effect should be made. (PE/COM/TA) 599-1985w, 1007-1991r

(2) (nonlinear, active, and nonreciprocal waveguide components) Distortion produced by undesired intermodulation. (MTT) 457-1982w

(3) Nonlinear distortion of multiple-frequency inputs that shows up as harmonics of the individual inputs plus the sum and difference products of the inputs and their harmonics. (PE/IC) 1143-1994r

(4) An analog line impairment in which modulation on one channel or at one frequency distorts the modulation on another channel or frequency. (C) 610.7-1995

(5) Intermodulation distortion refers to the family of system performance impairments caused by the nonlinear transfer characteristic of a broadband system, which produces spurious output signals (called "intermodulation products") at frequencies that are linear combinations of those of the input. The system output (S_o) can generally be related to the system input by the transfer equation:

$$S_o = AS_o + BS_i^2 + CS_i^3$$

AS_i = the fundamental signal term

The terms BS_i^2 and CS_i^2 represent the second-order and third-order distortion terms, respectively. The second-order term produces a second harmonic frequency component for every input signal frequency and intermodulation frequency components of the form $f_1 \pm f_2$. The third-order term produces a third harmonic frequency component for every input signal frequency and intermodulation frequency components of the form $f_1 \pm f_2 \pm f_3$ and $2f_1 \pm f_2$. Third-order distortion also produces cross-modulation where modulation of one carrier can appear on another carrier on the system even when the second carrier is unmodulated when input into the system. In CATV systems where the video carriers are spaced at 6 MHz intervals, the summation of the third-order intermodulation distortion signals is called "composite triple-beat distortion." CTB can become significant when all distortion components fall near a video carrier. In CATV systems, it is common practice to specify composite triple beat and cross-modulation distortion, and design the cable system to meet these specifications. The amplifier distortion levels are specified by the manufacturer for a full channel load condition (a single video carrier in each 6 MHz channel at a given level). In broadband systems, different types of carriers and modulation techniques may be operating on a cable system so that the composite triple beat and cross-modulation distortions are difficult to determine. In broadband systems it is common practice to design the system to composite triple beat specifications based on CATV practices. In addition, the carrier to discrete second-order beat and third-order beat ratios are specified. The distortion ratios are specified independently under referenced conditions for the inbound and outbound paths. Inbound distortion is specified at the headend with signals injected prior to the most remote amplifier of the worst-case inbound path. Outbound distortion is specified following the most remote (from the headend) amplifier of the worst-case outbound path. *Second-order distortion.* This parameter describes the spurious signals that are produced as a result of the second-order curvature of the transfer characteristic of the system components, when two discrete input signals are applied. The dominant members lie at frequencies given by

$$F_{21} = \left| F_a + F_b \right| \text{ and}$$

$$F_{22} = \left| F_a - F_b \right|$$

where

F_a and F_b = the frequencies of the input signals.

Third-order distortion. This parameter describes the spurious output signals that are produced as a result of the third-order curvature of the transfer characteristic of the system components, when three discrete input signals are applied. The dominant member lies at frequencies given by

$$F_3 = \left| F_a \pm F_b \pm F_c \right|$$

where F_a, F_b, and F_c = the frequencies of the input signals. (LM/C) 802.7-1989r

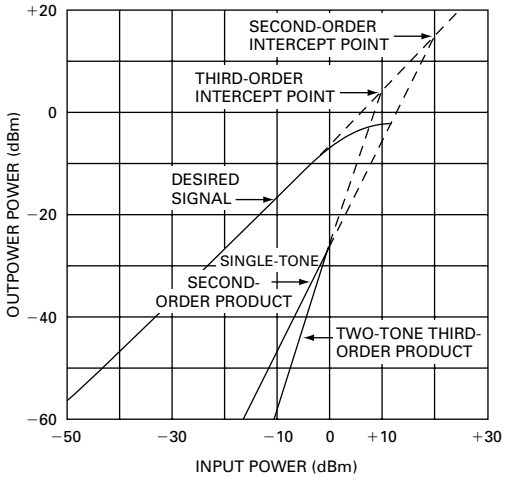
(6) Nonlinear distortion of a system or transducer characterized by the appearance of frequencies at the output equal to the sums and differences of integral multiples of two or more of the input frequencies. IMD is the ratio, in dB, of the test signal to specific spurious output signals generated by the nonlinearity. (COM/TA) 743-1995

(7) Nonlinear distortion of a system or transducer characterized by the appearance in the output of frequencies equal to the sums and differences of integral multiples of the two or more component frequencies present in the input wave. *Note:* Harmonic components also present in the output are usually not included as part of the intermodulation distortion. When harmonics are included, a statement to that effect should be made. *See also:* distortion. (SP) 151-1965w

intermodulation interference (mobile communication) The modulation products attributable to the components of a complex wave that on injection into a nonlinear circuit produces interference on the desired signal. *See also:* mobile communication system. (VT) [37]

intermodulation noise Noise characterized by the intermodulation of signals from two independent lines or separate components of the desired signal causing interference. (C) 610.7-1995

intermodulation product intercept point (nonlinear, active, and nonreciprocal waveguide components) Intermodulation products have an output-versus-input characteristic which, when graphically displayed, would theoretically intercept the plot of the desired output-versus-input if the nonlinear device continued to operate linearly without compression. The signal input level at which this theoretical point would occur is called the intercept point and is usually defined in dBm (decibel referred to one milliwatt). The corresponding figure is a graphical representation of the intercept points for a single-tone second order and a two-tone third-order intermodulation product.



intermodulation product intercept point
(MTT) 457-1982w

intermodulation products (1) (nonlinear, active, and nonreciprocal waveguide components) The undesired responses in a nonlinear device that result from harmonics of two or more signals. (MTT) 457-1982w
(2) *See also:* intermodulation distortion.

intermodulation rejection (spectrum analyzer) The ratio of the sensitivity level and the level of either of two equal amplitude signals which produce any intermodulation product at the sensitivity level. (IM) 748-1979w

intermodulation spurious emission (land-mobile communications transmitters) External radio frequency (RF) emission of a transmitter which is a product of the nonlinear mixing process in the final stage of the transmitter which occurs when external RF power is coupled through the antenna output. (EMC) 377-1980r

intermodulation spurious response (1) (receiver performance) The receiver audio output resulting from the mixing of *n*th-order frequencies, in the nonlinear elements of the receiver, in which the resultant carrier frequency is equivalent to the assigned frequency. *See also:* spurious response. (VT) [37]
(2) (nonreal time spectrum analyzer) The spectrum analyzer response resulting from the mixing of the nth order frequencies, in the nonlinear elements of the spectrum analyzer, in which the resultant response is equivalent to the tuned frequency. *Synonym:* intermodulation distortion. (IM) [14]
(3) (frequency-modulated mobile communications receivers) The response resulting from the mixing of two or more undesired frequencies in the nonlinear elements of the receiver in which a resultant frequency is generated that falls within the receiver passband. (VT) 184-1969w
(4) (spectrum analyzer) The spectrum analyzer response resulting from the mixing of the nth order frequencies of the input signal in the nonlinear elements of the spectrum analyzer, in which the resultant response is equivalent to the tuned frequency. *Synonym:* intermodulation distortion. (IM) 748-1979w

internal address field (IA) The group of low-order bits (right justified and contiguous to the device address field on the left) assigned in the address of a FASTBUS device which is used to identify internal locations within a FASTBUS device. Secondary address cycles allow the number of different locations accessed to exceed that available in the internal address field. (NID) 960-1993

internal arrow An arrow connected at both ends (source and use) to a box in a diagram. *Contrast:* boundary arrow. (C/SE) 1320.1-1998

internal audit (nuclear power quality assurance) An audit of those portions of an organization's quality assurance program retained under its direct control and within its organizational structure. (PE/NP) [124]

internal bias (teletypewriter) Bias, either marking or spacing, that may occur within a start-stop printer receiving mechanism and that will have an effect on the margins of operation. (COM) [49]

internal blocking (telephone switching systems) The unavailability of paths in a switching network between a given inlet and any suitable idle outlet. (COM) 312-1977w

internal connector (pothead) A connector that joins the end of the cable to the other current-carrying parts of a pothead. *See also:* pothead; transformer. (PE/TR) [107], 48-1975s, [108]

internal correction voltage (electron tube) The voltage that is added to the composite controlling voltage and is the voltage equivalent of such effects as those produced by initial electron velocity and contact potential. *See also:* composite controlling voltage. (ED) 161-1971w

internal font A font that is permanently loaded in a printer's memory. *Synonyms:* permanent font; built-in font. (C) 610.10-1994w

internal fuse (of a capacitor) A fuse connected inside a capacitor unit, in series with an element or a group of elements.power systems relaying. (PE) C37.99-2000

internal graticule (oscilloscopes) A graticule whose rulings are a permanent part of the inner surface of the cathode-ray tube faceplate. (IM) 311-1970w

internal heating (electrolysis) The electrolysis of fused electrolytes is the method of maintaining the electrolyte in a molten condition by the heat generated by the passage of current through the electrolyte. *See also:* fused electrolyte. (EEC/PE) [119]

internal impedance (rotating machinery) The total self-impedance of the primary winding under steady conditions. *Note:* For a three-phase machine, the primary current is considered to have only a positive-sequence component when evaluating this quantity. *See also:* asynchronous machine. (PE) [9]

internal impedance drop (rotating machinery) The product of the current and the internal impedance. *Note:* This is the phasor difference between the generated internal voltage and the terminal voltage of a machine. *See also:* asynchronous machine. (PE) [9]

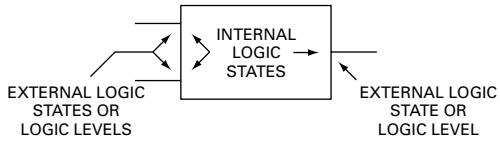
internal insulation (1) (surge arresters) (apparatus) The insulation that is not directly exposed to atmospheric conditions. (PE/TR) C57.12.80-1978r, [84], [8]
(2) (high voltage testing) Internal insulation comprises the internal solid, liquid, or gaseous elements of the insulation of equipment, which are protected from the effects of atmospheric and other external conditions such as contamination, humidity, vermin, etc. (C) 1313.1-1996
(3) Insulation comprising solid, liquid, or gaseous elements, which are protected from the effects of atmospheric and other external conditions such as contamination, humidity, vermin, etc. (PE/PSIM) 4-1995
(4) Insulating material provided in a radial direction around the energized conductor in order to insulate it from the ground potential. (PE/TR) C57.19.03-1996

internal label (1) A machine-readable label recorded on a data medium that provides information about the data recorded on the medium. *Contrast:* external label. *See also:* header label; end-of-volume label; end of file. (C) 610.5-1990w
(2) A label contained within a data medium, used to mark something such as the beginning or end of a file. *Contrast:* external label. *See also:* end-of-volume label; beginning-of-file label; beginning-of-volume label; end-of-file label. (C) 610.10-1994w
(3) A record in a known format in a known position within a volume that identifies the volume. (C/SS) 1244.1-2000

internal line fault A fault that occurs on the transmission line section that includes the series capacitor installation. (T&D/PE) 824-1994

internal load (power operations) Equal to customer load plus the station service load plus the transmission losses. (PE/PSE) 858-1987s

internal logic state A logic state assumed to exist inside a symbol outline at an input or an output. See figure below.



internal logic state

(GSD) 91-1984r

internally fused capacitor unit A capacitor unit that includes internal fuses.power systems relaying. (PE) C37.99-2000

internally-programmed automatic test equipment (test, measurement, and diagnostic equipment) An automated tester using any programming technique in which a substantial amount of programming information is stored within the equipment, although it may originate from external media. (MIL) [2]

internal memory *See:* internal storage.

internal merge sort A merge sort performed within main storage. *Contrast:* external merge sort. *See also:* two-way merge sort; Batcher's parallel sort; list merge sort. (C) 610.5-1990w

internal model A data model depicting entities within the conceptual schema of a database for a specific application. (C) 610.5-1990w

internal node *See:* nonterminal node.

internal ohmic measurements (battery) The measurement of either the internal impedance, conductance, or resistance of battery cells/units. (SB) 1188-1996

internal oxidation *See:* subsurface corrosion.

internal record A record within an internal view. *Synonym:* stored record. (C) 610.5-1990w

internal reference voltage An internally developed bias voltage used as an applied gate voltage in the read mode. (ED) 641-1987w

internal remanent residual voltage (Hall effect devices) That portion of the zero field residual voltage which is due to the remanent magnetic flux density in the ferromagnetic encapsulation of the Hall generator. (MAG) 296-1969w

internal resistance (batteries) The resistance to the flow of an electric current within a cell or battery. *See also:* battery. (EEC/PE) [119]

internal schema (A) A description of the format and layout of the entire contents of a database including the data as well as overhead portions such as indices. *Note:* Written using data definition language. *Contrast:* conceptual schema; external schema. **(B)** A description of the data as it is physically stored in a database, including a description of the environment in which the database is to reside. (C) 610.5-1990

internal short circuit (thyristor power converter) A short circuit caused by converter faults. *Note:* An internal short circuit may be fed from both ac and dc circuits: for example, in the cases of: converters with battery or motor loads; converters in a double converter; converters operating as inverters. (IA/IPC) 444-1973w

internal sort A sort performed within main storage. *Synonym:* in-core sort. *Contrast:* external sort. (C) 610.5-1990w

internal storage (1) (test, measurement, and diagnostic equipment) Storage facilities forming an integral part of the machine. (MIL) [2]

(2) Storage that is accessible by a processor without the use of input-output channels. *Note:* Includes main storage, and may include other kinds of storage such as cache memory and special-purpose registers. *Synonyms:* processor storage; internal memory. (C) 610.10-1994w

internal stress An aging stress that arises from the operational use of the equipment, e.g., voltage, temperature rises or gradients from losses, or self-induced mechanical vibration. (DEI/RE) 775-1993w

internal test (INTEST) A defined instruction for the test logic defined by IEEE Std 1149.1-1990. *Synonym:* INTEST. (TT/C) 1149.1-1990

internal test bus The system of wiring that carries analog test signals around the interior of an integrated circuit. *See also:* test bus interface circuit. (C/TT) 1149.4-1999

internal traffic (telephone switching systems) Traffic originating and terminating within the network being considered. (COM) 312-1977w

Internal Translator (IT) A programming language developed to handle numerical applications, scientific applications, or expressions evaluated from left to right ignoring operator precedence. (C) 610.13-1993w

internal triggering (1) (oscilloscopes) The use of a portion of a deflection signal (usually the vertical deflection signal) as a triggering-signal source. *See also:* oscillograph. (IM/HFIM) [40]

(2) (non-real time spectrum analyzer) The use of a deflection signal (usually the vertical deflection signal) as a triggering source. (IM) [14], 748-1979w

internal variable *See:* endogenous variable.

internal view The format, layout, and contents of the entire data content and overhead content of a database, as described in an internal schema. *Note:* There may be many external views of a database, but only one internal view. (C) 610.5-1990w

internal voltage surge (thyristor converter) Voltage surge caused by sources within a converter. *Note:* It may originate from blowing fuses, hole storage recovery phenomena, etc. Internal voltage surges are substantially under control of the circuit designer. (IA/IPC) 444-1973w

International Algebraic Language A forerunner of the ALGOL language. (C) 610.13-1993w

international call (telephone switching systems) A call to a destination outside of the national boundaries of the calling customer. (COM) 312-1977w

International Commission on Illumination *See:* CIE.

international direct distance dialing (telephone switching systems) The automatic establishing of international calls by means of signals from the calling device of a customer. (COM) 312-1977w

international distance dialing (telephone switching systems) The automatic establishing of international calls by means of signals from the calling device of either a customer or an operator. (COM) 312-1977w

International Federation of Information Processing An international organization of societies that serves information-processing professionals. *See also:* AFIPS. (C) 610.10-1994w

international interzone call (telephone switching systems) A call to a destination outside of a national or integrated numbering-plan area. (COM) 312-1977w

international intrazone call (telephone switching systems) A call to a destination within the boundaries of an integrated numbering-plan area, but outside the national boundaries of the calling customer. (COM) 312-1977w

internationalization The process of designing and developing an implementation with a set of features, functions, and options intended to satisfy a variety of cultural environments. *See also:* localization. (C/PA) 14252-1996

International Morse code (Continental code) A system of dot and dash signals, differing from the American Morse code only in certain code combinations, used chiefly in international radio and wire telegraphy. *See also:* telegraphy. (PE/EEC) [119]

international number (telephone switching systems) The combination of digits representing a country code plus a national number. (COM) 312-1977w

international operating center (telephone switching systems) In World Zone 1, a center where telephone operators handle originating and terminating international interzone calls and may also handle international intrazone calls. *See also:* world-zone number. (COM) 312-1977w

International Organization for Standardization An international organization that establishes and maintains standards for many different industries. (C) 610.7-1995, 610.10-1994w

international originating toll center (telephone switching systems) In World Zone 1, a toll center where telephone operators handle originating international interzone calls. *See also:* world-zone number. (COM) 312-1977w

international switching center (telephone switching systems) A toll office that normally serves as a point of entry or exit for international interzone calls. (COM) 312-1977w

International System of Electrical Units A system that uses the international ampere and the international ohm. *Notes:* 1. The international ampere was defined as the current that will deposit silver at the rate of 0.00111800 gram per second: and the international ohm was defined as the resistance at 0 degrees Celsius of a column of mercury having a length of 106.300 centimeters and a mass of 14.4521 grams. 2. The International System of Electrical Units was in use between 1893 and 1947 inclusive. By international agreement it was discarded, effective January 1, 1948 in favor of the MKSA system. 3. Experiments have shown that as these units were maintained in the United States of America, 1 international ohm equalled 1.000495 ohm and that 1 international ampere equalled 0.999835 ampere. *See also:* International System of Units. (Std100) 270-1966w

International System of Units (SI) A universal coherent system of units in which the following six units are considered basic: meter, kilogram, second, ampere, Kelvin degree, and candela. *Notes:* 1. The MKSA system of electrical units (MKSA System of Units) is a constituent part of this system adequate for mechanics and electromagnetism. 2. The electrical units of this system should not be confused with the units of the earlier International System of Electrical Units which was discarded January 1, 1948. 3. The International System of Units (abbreviated SI) was promulgated in 1960 by the Eleventh General Conference on Weights and Measures. *See also:* units and letter symbols. (Std100) 270-1966w

International Telecommunication Union-Telecommunications Standardization Sector (ITU-TSS) An international organization formerly known as Consultative Committee on International Telegraphy and Telephony (CCITT). *Note:* In March 1993 the CCITT was reorganized and renamed as ITU-TSS. (C) 610.7-1995

International Telegraph and Telephone Consultative Committee An international organization that studies and issues recommendations on issues related to communication technology. *Note:* Also know as CCITT, acronym for Comité Consultatif International de Télégraphique et Téléphonique (French). (C) 610.10-1994w

internetworking The network communication that occurs among devices across multiple networks. (C) 610.7-1995

interoffice call (telephone switching systems) A call between lines connected to different central offices. (COM) 312-1977w

interoffice trunk (1) (telephony) A direct trunk between local central offices in the same exchange. (EEC/PE) [119]

(2) A trunk connecting two telephone offices. (C) 610.7-1995

interoperability (1) (software) The ability of two or more systems or elements to exchange information and to use the information that has been exchanged. *See also:* compatibility (ATLAS/C/PA/SCC20) 1232-1995, 610.12-1990, 14252-1996, 1232.1-1997

(2) The capability for units of equipment to work together to do useful functions. (C/BA) 14536-1995

(3) The capability, promoted but not guaranteed by joint conformance with a given set of standards, that enables heterogeneous equipment, generally built by various vendors, to work together in a network environment. (DIS/C) 1278.2-1995

(4) The ability of two or more systems or components to exchange information in a heterogeneous network and use that information. (C/SE) 1430-1996

interoperability interface A concept of embodying NIRL policies in software objects, interfaces, and services used during interoperation. This allows for enforcement of policy which provides assurance of transaction integrity for interoperation of reuse libraries. (C/SE) 1430-1996

interoperability testing Testing conducted to ensure that a modified system retains the capability of exchanging information with systems of different types, and of using that information. (C/SE) 1219-1998

interoperable Said of two modules indicating that they may both be placed on the same physical MTM-Bus without causing errors of operation. (TT/C) 1149.5-1995

interoperable modules A set of modules that have the properties necessary to allow them to work together in a system to do useful functions. The necessary parameters include items such as electrical, protocol, mechanical, thermal, and I/O interfaces. (C/BA) 14536-1995

interoperate, interoperability Compatibility of modules with each other or with the system/back-plane into which they are inserted. When a pair of such units is said to *interoperate*, (a) they cannot suffer damage as a consequence of being powered and functioning in the same system; (b) the modules and the system will each be able to perform the basic function for which they were designed; (c) the modules will be able to communicate with each other using specified Futurebus+ transactions. Some modules or backplanes will have optional features not shared by others in the same system, so they need to be able to default to the smaller common set in order to communicate with each other. A module or system working in such a reduced-capability mode may suffer performance degradation that may be severe, but will still be interoperable in that system. (C/BA) 896.10-1997, 896.2-1991w

Inter-Packet Gap (IPG) A delay or time gap between CSMA/CD packets intended to provide interframe recovery time for other CSMA/CD sublayers and for the Physical Medium. For example, for 10BASE-T, the IPG is 9.6 μs (96 bit times); for 100BASE-T, the IPG is 0.96 μs (96 bit times). (C/LM) 802.3-1998

interphase rod or shaft A component of a switch-operating mechanism designed to connect two or more poles of a multipole switch for group operation. (SWG/PE) C37.100-1992, C37.30-1971s

interphase transformer (1) An autotransformer, or a set of mutually coupled reactors, used to obtain parallel operation between two or more simple rectifiers that have ripple voltages that are out of phase. *See also:* rectifier transformer. (PE/TR) [57], C57.12.80-1978r

(2) (thyristor power converter) An autotransformer, or a set of mutually coupled inductive reactors, used to obtain multiple operation between two or more simple converters that have ripple voltages that are out of phase. (IA/IPC) 444-1973w

interphase-transformer loss (rectifier transformer) The losses in the interphase transformer that are incident to the carrying of rectifier load. *Note:* They include both magnetic core loss and conductor loss. *See also:* rectifier transformer. (Std100) C57.18-1964w

interphase-transformer rating Consists of the root-mean-square current, root-mean-square voltage, and frequency, at the terminals of each winding, for the rated load of the rectifier unit, and a designated amount of phase control, as assigned to it by the manufacturer. *See also:* rectifier transformer; duty. (PE/TR) [57]

interphone *See:* intercommunicating system.

interphone equipment (aircraft) Equipment used to provide telephone communications between personnel at various locations in an aircraft. (EEC/PE) [119]

interpolation (signal interpolation) (submarine cable telegraphy) A method of reception characterized by synchronous restoration of unit-length signal elements which are weak or missing in the received signals as a result of one or more of such factors as suppression at the transmitter, attenuation in transmission, or discrimination in the receiving networks. *Note:* This is sometimes referred to as local correction. *See also:* telegraphy. (PE/EEC) [119]

interpolation function (burst measurements) A function that may be used to obtain additional values between sampled values. *See also:* burst. (SP) 265-1966w

interpolation search A searching technique in which, at each step of the search, an estimate is made of where the desired record is apt to be. *Synonyms:* external entry search; estimated entry search. *Contrast:* Fibonacci search; dichotomizing search; binary search. (C) 610.5-1990w

interpole *See:* commutating pole.

interposing relay (1) (supervisory control, data acquisition, and automatic control) (station control and data acquisition) A device that enables the energy in a high-power circuit to be switched by a low-power control signal. (SWG/SUB/PE) C37.1-1987s, C37.100-1992

(2) (of a supervisory system) An auxiliary relay at the master or remote station, the contacts of which serve: (1) to energize a circuit (for closing, opening, or other purpose) of an element of remote station equipment when the selection of a desired point has been completed and when suitable operating signals are received through the supervisory equipment from the master station; or (2) to connect in the circuit the telemeter transmitting and receiving equipment, respectively, at the remote and master stations. *Note:* The interposing relays are considered part of a supervisory system. (SWG/PE) C37.100-1992

interpret (software) To translate and execute each statement or construct of a computer program before translating and executing the next. *Contrast:* compile; assemble. (C) 610.12-1990

interpretation line A human-readable interpretation of the bar code that is clearly identifiable with the bar code symbol that shall represent the encoded characters. (PE/TR) C57.12.35-1996

interpreted card A punch card whose information content is made readable to the human eye by being printed across the top portion of the card. (C) 610.10-1994w

interpreter (1) (software) A computer program that translates and executes each statement or construct of a computer program before translating and executing the next. *Contrast:* assembler; compiler. (C) 610.12-1990

(2) A device that prints on a punch card the characters corresponding to hole patterns punched in the card. *Note:* The result is called an "interpreted card." *See also:* transfer interpreter. (C) 610.10-1994w

(3) A functional entity that translates one or more printer control or page description languages into a form suitable for the marking engine. Since printers sometimes emulate original implementations of these languages, interpreters are sometimes called emulations. (C/MM) 1284.1-1997

interpreter language The printer machine language, or page description language, by which information to be imaged or to be used in imaging is coded. (C/MM) 1284.1-1997

interpretive code Computer instructions and data definitions expressed in a form that can be recognized and processed by an interpreter. *Contrast:* machine code; assembly code; compiler code. (C) 610.12-1990

inter-record gap (test, measurement, and diagnostic equipment) An interval of space or time deliberately left between recording portions of data or records. Such spacing is used to prevent errors through loss of data or overwriting and permits tape stop-start operations. (MIL) [2]

interrecord gap The space between two consecutive records on a data medium. (C) 610.10-1994w

interreflection *See:* interflection.

inter-repeater link (IRL) A mechanism for connecting two and only two repeater sets. (C/LM) 802.3-1998

interrogation In a transponder system, the signal or combination of signals intended to trigger a response. (AES) 686-1997

interrogative supervisory system A system whereby the master station controls all operations of the system, and whereby all indications are obtained on a master station request or interrogation basis. *Note:* The normal state is usually one of continuous interrogation or polling of the remote stations for changes in status. (SWG/PE) C37.100-1992

interrogator The transmitter of a secondary radar system. (AES) 686-1997

interrogator-transponder A combined interrogator and transponder. (AES) 686-1997

interrogator-respondor (IR) (radar) A combined radio transmitter and receiver for interrogating a transponder and reporting the resulting replies independently of a radar echo display. *See also:* interrogator. (AES/RS) 686-1990

interrupt (1) (A) (software) The suspension of a process to handle an event external to the process. *Synonym:* interruption. *See also:* interrupt service routine; interrupt mask; priority interrupt; interrupt latency; interrupt priority. **(B) (software)** To cause the suspension of a process. **(C) (software)** Loosely, an interrupt request. (C) 610.12-1990

(2) A signal for a processor to suspend one process and begin another. As implemented in IEEE Std 1451.2-1997, an interrupt is a signal from the Smart Transducer Interface Module that enables it to request service from the Network Capable Application Processor. (IM/ST) 1451.2-1997

(3) A mechanism provided to allow a device communications controller (DCC) to request service from a bedside communications controller (BCC) prior to the next scheduled polling time. Interrupt is also used to establish initial connection for high-speed DCCs. (EMB/MIB) 1073.4.1-2000

interrupt-acknowledge cycle (1) A data transfer bus (DTB) cycle, initiated by an interrupt handler, that reads a status/ID from an interrupter. An interrupt handler generates this cycle whenever it detects an interrupt request from an interrupter and it has control of the DTB. (C/BA) 1014-1987

(2) A DTB cycle that is initiated by a master in response to an interrupt request from a slave. An interrupt-acknowledge cycle involves two types of slaves. "Contending slaves" have an interrupt request pending and participate in the cycle. The "responding slave" is the one that transfers its status/ID information to the master. During the interrupt-acknowledge cycle, all contending slaves drive an interrupt ID on the bus. This ID is a combination of the geographical address of the board that is supplied by the backplane slot, and a priority code that is supplied by user-defined on-board logic. The interrupt ID is used to determine which of the contending slaves will respond to the cycle. *See also:* contending slave; responding slave. (C/MM) 1096-1988w

interrupted continuous wave (ICW) A continuous wave that is interrupted at a constant audio-frequency rate. *See also:* radio transmission. (AP/BT/ANT) 145-1983s, 182A-1964w

interrupted quick-flashing light (illuminating engineering) A quick flashing light in which the rapid alternations are interrupted by periods of darkness at regular intervals. (EEC/IE) [126]

interrupter (1) An element designed to interrupt specified currents under specified conditions. (SWG/PE) C37.100-1992

(2) A functional module that generates an interrupt request on the priority interrupt bus, and then provides status/ID information when the interrupt handier requests it. (C/BA) 1014-1987

interrupter blade (of an interrupter switch) A blade used in the interrupter for breaking the circuit. (SWG/PE) C37.100-1992

interrupter relay contacts An additional set of contacts on a stepping relay, operated directly by the armature. (EEC/REE) [87]

interrupter switch (1) An air switch, equipped with an interrupter, for making or breaking specified currents, or both. *Note:* The nature of the current made or broken or both may be indicated by suitable prefix; that is load-interrupter switch, fault-interrupter switch, capacitor-current interrupter switch, etc. (SWG/PE/IA/PSE) C37.100-1992, 241-1990r

(2) A switching device, designed for making specified currents and breaking specified steady state currents. (HVS, Swg). *Note:* The nature of the current made or broken, or both, may be indicated by suitable prefix; that is, load interrupter switch, loop interrupter switch, unloaded line interrupter switch, etc. (SWG/PE) 1247-1998

interrupt handler A functional module that detects interrupt requests generated by interrupters and responds to those requests by asking for status/ID information. (C/BA) 1014-1987

interruptible load (1) Demand that can be interrupted by the supplying system in accordance with contractual provisions. (PE/PSE) 858-1993w

(2) (electric power utilization) A load which can be interrupted as defined by contract. *See also:* generating station. (PE/PSE) 346-1973w

interruptible load reserve (power operations) The operating reserve available through disconnection of interruptible loads. (PE/PSE) 858-1987s

interruptible power (power operations) Power which can be interrupted as defined by contract. (PE/PSE) 858-1987s

interrupting aid An arc-interrupting device that can be attached to an air switch to improve its interrupting capability. (SWG/PE) C37.100-1992, C37.36b-1990r

interrupting capacity (packaging machinery) The highest current at rated voltage that the device can interrupt. (IA/PKG) 333-1980w

interrupting current The current in a pole of a switching device at the instant of the initiation of the arc. *Synonym:* breaking current. (SWG/PE) C37.100-1992

interrupting device A device capable of being reclosed whose purpose is to interrupt faults and restore service or disconnect loads. These devices can be manual, automatic, or motor-operated. Examples may include transmission breakers, feeder breakers, line reclosers, motor-operated switches, or others. (PE/T&D) 1366-1998

interrupting device event The operation associated with the interrupting device for cases where a reclosing device operates but does not lockout and where a switch is opened only temporarily. (PE/T&D) 1366-1998

interrupting device operation The operation associated with a reclosing device for cases where the switch opens and closes once but does not lockout. (PE/T&D) 1366-1998

interrupting rating (protection and coordination of industrial and commercial power systems) A rating based on the highest root-mean-square (rms) alternating current that the fuse is required to interrupt under the conditions specified. The interrupting rating, in itself, has no direct bearing on any current-limiting effect of the fuse. (IA/PSP) 242-1986r

interrupting tests Tests that are made to determine or check the interrupting performance of a switching device. (SWG/PE) C37.100-1992, C37.40-1981s

interrupting time (of a mechanical switching device) The interval between the time when the actuating quantity of the release circuit reaches the operating value, the switching device being in a closed position, and the instant of arc extinction on the primary arcing contacts. *Notes:* 1. Interrupting time is numerically equal to the sum of opening time and arcing time. 2. In multipole devices, interrupting time may be measured for each pole or for the device as a whole, in which latter case, the interval is measured to the instant of arc extinction in the last pole to clear. *Synonym:* total break time. (SWG/PE) C37.100-1992

interruption (1) The complete loss of voltage for a time period. The time-base of the interruption is characterized as follows:

— Instantaneous: 0.5 to 30 cycles
— Momentary: 30 cycles to 2 s
— Temporary: 2 s to 2 min
— Sustained: greater than 2 min

(T&D/PE) 1250-1995

(2) The loss of service to one or more customers. *Note:* It is the result of one or more component outages, depending on system configuration. (EEC/PE/T&D/ACO) [109], 1366-1998

(3) The loss of electric power supply to one or more loads. (IA/PSE) 493-1997, 399-1997

(4) The complete loss of voltage for a time period. (IA/PSE) 1100-1999

(5) The suspension of a process to handle an event external to the process. (C) 610.12-1990

interruption duration (1) (electron power systems) The period from the initiation of an interruption to a consumer or other facility until service has been restored to that consumer or facility. *See also:* outage. (PE/PSE) [54]

(2) The period (measured in seconds, or minutes, or hours, or days) from the initiation of an interruption to a customer or other facility until service has been restored to that customer or facility. An interruption may require step-restoration tracking to provide reliable index calculation. It may be desirable to record the duration of each interruption. (PE/T&D) 1366-1998

interruption duration index (electric power system) The average interruption duration for consumers interrupted during a specified time period. It is estimated from operating history by dividing the sum of all consumer interruption durations during the specified period by the number of consumer interruptions during that period. *See also:* outage. (PE/PSE) [54]

interruption, forced *See:* forced interruption.

interruption frequency The expected (average) number of power interruptions to a load per unit time, usually expressed as interruptions per year. (IA/PSE) 493-1997, 399-1997

interruption frequency index (electric power system) The average number of interruptions per consumer served per time unit. *Note:* It is estimated from operating history by dividing the number of consumer interruptions observed in a time unit by the number of consumers served. A consumer interruption is considered to be one interruption of one consumer. *See also:* outage. (PE/PSE) [54]

interruption, momentary event *See:* momentary event interruption.

interruptions caused by events outside of distribution For most utilities, this type of interruption is a small percentage of the total interruptions. It will be defined here to account for the cases where outside influences are a major occurrence. Three categories that may be helpful to monitor are: transmission, generation, and substations. (PE/T&D) 1366-1998

interruption, scheduled *See:* scheduled interruption.

interruption to service The isolation of an electrical load from the system supplying that load, resulting from an abnormality in the system. (SWG/PE) C37.100-1992

interrupt latency The delay between a computer system's receipt of an interrupt request and its handling of the request. *See also:* interrupt priority. (C) 610.12-1990

interrupt mask A mask used to enable or disable interrupts by retaining or suppressing bits that represent interrupt requests. (C) 610.12-1990

interrupt operation (FASTBUS acquisition and control) A FASTBUS write operation to an interrupt service device, notifying it that the sender requires attention. (NID) 960-1993

interrupt priority The importance assigned to a given interrupt request. This importance determines whether the request will cause suspension of the current process and, if there are several outstanding interrupt requests, which will be handled first. (C) 610.12-1990

interrupt register A special-purpose register that holds data necessary for handling interrupts. (C) 610.10-1994w

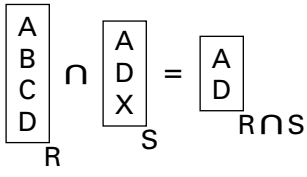
interrupt request A signal or other input requesting that the currently executing process be suspended to permit performance of another process. (C) 610.12-1990

interrupt service device (ISD) (FASTBUS acquisition and control) A processor or other device that can respond to interrupt operations. (NID) 960-1993

interrupt service routine A routine that responds to interrupt requests by storing the contents of critical registers, performing the processing required by the interrupt request, restoring the register contents, and restarting the interrupted process. (C) 610.12-1990

interrupt vector A value provided by an input-output device, used to distinguish between different input-output functions which can generate the same interrupt. *Note:* A table of interrupt vectors is often provided to allow a processor to look up the address of a service routine. (C) 610.10-1994w

intersection (1) A relational operator that combines two relations having the same degree and results in a relation containing all of the tuples that are in both of the original relations. *See also:* selection; projection; product; join; union; difference.



intersection

(C) 610.5-1990w

(2) *See also:* AND. (C) 1084-1986w

interspersing (rotating machinery) Interchanging the coils at the edges of adjacent phase belts. *Note:* The purpose of interspersing depends on the type of machine in which it is done. In asynchronous motors it is used to reduce harmonics that can cause crawling. *See also:* asynchronous machine. (PE) [9]

interstage punching A mode of card punching such that either the odd- or even-numbered card columns are used. (C) 610.10-1994w

intersymbol interference (modulation systems) (transmission system) Extraneous energy from the signal in one or more keying intervals that tends to interfere with the reception of the signal in another keying interval, or the disturbance that results. (Std100) 270-1964w

intersymbol interference penalty The power penalty due to the finite bandwidth of the link. (C/LM) 802.3-1998

intersystem electromagnetic compatibility (control of system electromagnetic compatibility) The condition that enables a system to function without perceptible degradation due to electromagnetic sources in another system. C63.12-1984

intertoll dialing (telephony) Dialing over intertoll trunks. (PE/EEC) [119]

intertoll trunk (telephone switching systems) A trunk between two toll offices. (COM) 312-1977w

interturn insulation (rotating machinery) The insulation between adjacent turns, often in the form of strips. (PE) [9]

interturn test *See:* turn-to-turn test.

interval (1) The spacing between two sounds in pitch or frequency, whichever is indicated by the context. *Note:* The frequency interval is expressed by the ratio of the frequencies or by a logarithm of this ratio. (SP/ACO) [32]

(2) (pulse terminology) The algebraic time difference calculated by subtracting the time of a first specified instant from the time of a second specified instant. (IM/WM&A) 194-1977w

interval-oriented simulation A continuous simulation in which simulated time is advanced in increments of a size suitable to make implementation possible on a digital system. (C) 610.3-1989w

interval, sweep holdoff *See:* sweep holdoff interval.

interval timer A timer, sometimes programmable, which generates a periodic interrupt to a processor, used as a time reference. (C) 610.10-1994w

intervening slave The participating slave that, although not the repository of last resort of the requested data, finds it necessary to prevent the repository of last resort from providing the requested data. Having done so, the intervening slave provides the data instead. (C/BA) 10857-1994, 896.4-1993w, 896.3-1993w

interword spacing In text formatting, the amount of space left between words on a line. *Contrast:* intercharacter spacing. *See also:* line filling. (C) 610.2-1987

interworkability The capability for units of equipment to coexist in the same system, or on the same backplane, and accomplish useful work. (However, units that are interworkable only are not required to work together to accomplish a task. They should only not interfere with one another.) (C/BA) 14536-1995

interworking unit (IWU) A unit that provides the functions needed to allow interworking between a PSN and another network, e.g., interworking between a PSN and an ITU-T X.25 packet-switched public data network (PSPDN). (C/LM/COM) 802.9a-1995w, 8802-9-1996

INTEST *See:* internal test.

intrabeam viewing (laser maser) The viewing condition whereby the eye is exposed to all or part of a laser beam. (LEO) 586-1980w

intra-concha receiver A receiver that essentially fills the ear concha but does not enter the ear canal. (COM/TA) 1206-1994

intraLATA In the United States, a collection of circuits that are totally within a single local access and transport area and are the sole responsibility of the local telephone company. *See also:* interLATA. (C) 610.7-1995

intramodal distortion (fiber optics) That distortion resulting from dispersion of group velocity of a propagating mode. It is the only distortion occurring in single mode waveguides. *See also:* distortion; dispersion. (Std100) 812-1984w

intranet A managed network operating strictly within a single legal entity. More than one intranet may exist within the legal entity, and may be isolated for security reasons. (C) 2001-1999

intra-office blocking Matching loss averaged over all line-to-line connection classes on an ABSBH basis. A connection class is a group of network terminals distinguished by their relative locations in the switching network. Examples include all lines on a single switch, all lines on a single concentrator, all lines on a single switching frame, etc. Matching losses differ among connection classes. *See also:* matching loss. (COM/TA) 973-1990w

intra-office call (telephone switching systems) A call between lines connected to the same central office. (COM) 312-1977w

intrasystem electromagnetic compatibility (control of system electromagnetic compatibility) The condition that enables the various portions of a system to function without perceptible degradation due to electromagnetic sources in other portions of the same system. (Std100) C63.12-1984

intrinsic The specification that a property is total (i.e., mandatory), single-valued, and constant. (C/SE) 1320.2-1998

intrinsically safe circuit A circuit in which any spark or thermal effect is incapable of causing ignition of a mixture of flammable or combustible material in air under prescribed test

conditions. Test conditions generally consider opening, shorting, grounding, or field wiring, along with failures in the circuit. (IA/MT) 45-1998

intrinsically safe equipment and wiring Equipment and wiring that are incapable of releasing sufficient electrical or thermal energy under normal or abnormal conditions to cause ignition of a specific hazardous atmospheric mixture in its most easily ignited concentration. This equipment is suitable for use in division 1 locations. Division 2 Equipment and Wiring are equipment and wiring which in normal operation would not ignite a specific hazardous atmosphere in its most easily ignited concentration. The circuits may include sliding or make-and-break contacts releasing insufficient energy to cause ignition. Circuits not containing sliding or make-and-break contacts may have higher energy levels potentially capable of causing ignition under fault conditions. (NEC/IA/PC) [11]

intrinsic coercive force The magnetizing force at which the intrinsic induction is zero when the material is in a symmetrically cyclically magnetized condition.

(Std100) 270-1966w

intrinsic date An "instant" in time that is valid without dependence on any specific calendar system or date format. *Note:* An abstract date to and from which all other calendar systems and date representations can be transformed.

(C/PA) 2000.1-1999

intrinsic font *See:* bit map font.

intrinsic impedance For a monochromatic (time harmonic) electromagnetic wave propagating in a homogeneous isotropic medium, the ratio of the complex amplitude of the electric field to that of the magnetic field. *Note:* The intrinsic impedance of a medium is sometimes referred to as the characteristic impedance of the medium.

(AP/PROP) 211-1997

intrinsic induction (magnetic polarization) At a point in a magnetized body, the vector difference between the magnetic induction at that point and the magnetic induction that would exist in a vacuum under the influence of the same magnetizing force. This is expressed by the equation $\mathbf{B}_i = \mathbf{B} - \mu_0\mathbf{H}$. *Note:* In the centimeter-gram-second electromagnetic-unit system, $\mathbf{B}_i/4\pi$ is often called magnetic polarization.

(Std100) 270-1966w

intrinsic joint loss (fiber optics) That loss, intrinsic to the fiber, caused by fiber parameter (for example, core dimensions, profile parameter) mismatches when two nonidentical fibers are joined. *See also:* gap loss; extrinsic joint loss; lateral offset loss; angular misalignment loss. (Std100) 812-1984w

intrinsic loss (or gain) (waveguide) A loss (or gain) resulting from placing two ports of a network between generator and load impedance whose values are adjusted for maximum power absorbed in the load. It is the ratio of the available power from the generator (without generator adjustment) to the power delivered to the load with the network present.

(MTT) 146-1980w

intrinsic permeability The ratio of intrinsic normal induction to the corresponding magnetizing force. *Note:* In anisotropic media, intrinsic permeability becomes a matrix.

(Std100) 270-1966w

intrinsic properties (semiconductor) The properties of a semiconductor that are characteristic of the pure, ideal crystal. *See also:* semiconductor.

(AES/IA/ED) [41], 270-1966w, [12], 216-1960w

intrinsic relationship A kind of relationship that is total, single-valued, and constant from the perspective of (at least) one of the participating classes, referred to as a *dependent class*. Such a relationship is considered to be an integral part of the essence of the dependent class. For example, a transaction has an intrinsic relationship to its related account because it makes no sense for an instance of a transaction to "switch" to a different account since that would change the very nature of the transaction. *Contrast:* nonintrinsic relationship.

(C/SE) 1320.2-1998

intrinsic semiconductor (1) (germanium gamma-ray detectors) (charged-particle detectors) (x-ray energy spectrometers) A semiconductor containing an equal number of free holes and electrons throughout its volume. The term "intrinsic germanium" is often used incorrectly for "high purity germanium". *See also:* intrinsic semiconductor.

(NPS/NID) 759-1984r, 300-1988r, 325-1996

(2) A semiconductor whose charge-carrier concentration is substantially the same as that of the ideal crystal. *See also:* semiconductor. (ED) 216-1960w

(3) (power semiconductor) A semiconductor in which holes and electrons are created solely by thermal excitation across the energy gap. In an intrinsic semiconductor the concentration of holes and electrons must always be the same.

(PE/EDPG) [93]

intrinsic temperature range (semiconductor) The temperature range in which the charge-carrier concentration of a semiconductor is substantially the same as that of an ideal crystal. *See also:* semiconductor.

(IA/CEM) 270-1966w, [12], [64]

introspective testing *See:* self-test.

intruder A body that is in motion in an ESD event. The intruder is usually, but not necessarily, charged relative to its surroundings. It is always at a potential different from that of the receptor. (EMC/PE/SPD) C63.16-1993, C62.47-1992r

intruder electrode geometry The size and shape of that surface of the intruder, termed the intruder electrode, at which the ESD takes place. (SPD/PE) C62.47-1992r

intrusion Unauthorized human access to the substation property through physical presence or external influence.

(PE/SUB) 1402-2000

intrusion detection Sensing the presence of an intruder or object within specific confines. (PE/NP) 692-1997

***in utero* study** Referring to studies involving the unborn animal.

(T&D/PE) 539-1990

invalid (I) An attribute assigned to a cache line if there is not an up-to-date copy in the module's cache.

(C/BA) 896.4-1993w

invalid character* *See:* illegal character.

* Deprecated.

invalid date-component value A conditionally invalid date-component value or an unconditionally invalid date-component value. (C/PA) 2000.1-1999

invalid date-specifier A date representation that contains one or more invalid date-component values.

(C/PA) 2000.1-1999

invalid frame (1) (local area networks) A frame that is marked with an Invalid Packet Marker (IPM) or that has been identified by the MAC, Repeater Medium Access Control (RMAC), or lower sublayers as containing errors.

(C) 8802-12-1998

(2) A PDU that either

1) Does not contain an integral number of octets,
2) Does not contain at least two address octets and a control octet, or
3) Is identified by the physical layer or MAC sublayer as containing data bit errors.

(C/LM/CC) 8802-2-1998

invalid packet marker (IPM) (local area networks) A pattern used by a repeater that is substituted for the end of stream delimiter (esd) in the MII channel transmission frames to identify a packet that was received with transmission errors.

(C) 8802-12-1998

invariant An assertion that should always be true for a specified segment or at a specified point of a computer program.

(C) 610.12-1990

invariant imbedding A mathematical technique that can be employed to treat radiative transfer problems in the presence of inhomogeneous profiles of absorption and temperature. In it a boundary-value problem is converted to an initial value problem that incorporates the boundary conditions in the

equations themselves. The equations are in the form of first-order ordinary differential equations and can be solved by standard methods of initial value problems. (AP/PROP) 211-1997

inverse *See:* ones complement.

inverse binary state *See:* ones complement.

inverse electrode current The current flowing through an electrode in the direction opposite to that for which the tube is designed. *See also:* electrode current. (ED) 161-1971w, [45]

inverse magnitude contours *See:* magnitude contours.

inverse networks Two two-terminal networks are said to be inverse when the product of their impedances is independent of frequency within the range of interest. *See also:* network analysis. (Std100) 270-1966w

inverse neutral telegraph transmission That form of transmission employing zero current during marking intervals and current during spacing intervals. *See also:* telegraphy. (COM) [49]

inverse Nyquist diagram *See:* Nyquist diagram.

inverse-parallel connection An electric connection of two rectifying elements such that the cathode of the first is connected to the anode of the second, and the anode of the first is connected to the cathode of the second. (IA/ICTL/IAC) [60]

inverse period (rectifier element) The nonconducting part of an alternating-voltage cycle during which the anode has a negative potential with respect to the cathode. *See also:* rectification. (PE/EEC) [119]

inverse ratio photocontrol A photocontrol with the turn-off at a lower value than turn-on. (RL) C136.10-1996

inverse standing wave ratio [test] method A test that determines the power dissipation characteristics of a damper by the measurement of antinodal and nodal amplitudes on the span at each tunable harmonic. (T&D/PE) 664-1993

inverse-square law (illuminating engineering) A law stating that the illuminance E at a point on a surface varies directly with the intensity I of a point source, and inversely as the square of the distance d between the source and the point. If the surface at the point is normal to the direction of the incident light, the law is expressed by $E = I/d^2$. *Note:* For sources of finite size having uniform luminance this gives results which are accurate within one percent when d is at least five times the maximum dimension of the source as viewed from the point on the surface. Even though practical interior luminaires do not have uniform luminance, this distance, d, is frequently used as the minimum for photometry of such luminaires, when the magnitude of the measurement error is not critical. (EEC/IE) [126]

inverse-synthetic-aperture radar (ISAR) An imaging radar in which cross-range resolution (angular resolution) of a target (such as a ship, aircraft, or other reflecting object) is obtained by resolving in the Doppler domain the different Doppler frequencies produced by echoes from the individual parts of the object, when these different Doppler frequencies are caused by the object's own angular rotation relative to the radar. (AES) 686-1997

inverse time (1) (as applied to circuit breakers) A qualifying term indicating there is purposely introduced a delay in the tripping action of the circuit breaker, which delay decreases as the magnitude of the current increases. (NESC/NEC) [86]

(2) *See also:* inverse-time relay. (ICTL)

inverse-time delay A qualifying term indicating that there is purposely introduced a delaying action, the delay decreasing as the operating force increases. (PE) C37.100-1992

inverse-time overcurrent relay A current operated relay that produces an inverse time-current characteristic by integrating a function of current $F(I)$ with respect to time. The function $F(I)$ is positive above and negative below a predetermined input current called the pickup current. Pickup current is therefore the current at which integration starts positively and the relay produces an output when the integral reaches a predetermined positive set value. For the induction relay, it is the disk velocity that is the function of current $F(I)$ that is integrated to produce the inverse-time characteristic. The velocity is positive for current above and negative for current below a predetermined pickup current. The predetermined set value of the integral represents the disk travel required to actuate the trip output. (PE/PSR) C37.112-1996

inverse-time relay A relay in which the input quantity and operating time are inversely related throughout at least a substantial portion of the performance range. *Note:* Types of inverse-time relays are frequently identified by such modifying adjectives as "definite minimum time," "moderately," "very," and "extremely" to identify relative degree of inverseness of the operating characteristics of a given manufacturer's line of such relays. (SWG/PE) C37.100-1992

inverse transfer function The reciprocal of a transfer function. (CS/PE/EDPG) [3]

inverse transfer locus The locus of the inverse transfer function. (CS/PE/EDPG) [3]

inverse voltage (rectifier) The voltage applied between the two terminals in the direction opposite to the forward direction. This direction is called the backward direction. *See also:* rectification of an alternating current. (Std100) [84]

inversion (1) (A) (metal-nitride-oxide field-effect transistor) The state of the silicon surface in the insulated-gate field-effect transistor (IGFET) structure when the voltage leading to depletion has been further increased such that a thin layer of minority carriers becomes stable at the surface. **(B) (mathematics of computing)** In Boolean algebra, the same as NOT. **(C) (mathematics of computing)** The process of taking the reciprocal of a number. (ED/C) 581-1978, 1084-1986

(2) (data management) The process of constructing an inverted list to be used to access a set of records. (C) 610.5-1990w

inversion efficiency The ratio of output fundamental power to input direct power expressed in percent. *See also:* self-commutated inverters. (IA) [62]

inversion ratio (laser maser) In a maser medium, the negative of the ratio of the population difference between two nondegenerate energy states under a condition of population inversion to the population difference at equilibrium. (LEO) 586-1980w

invert (A) To change a binary variable to its opposite logic state. **(B)** To take the reciprocal of a number. (C) 1084-1986

inverted (rotating machinery) Applied to a machine in which the usual functions of the stationary and revolving members are interchanged. Example: an induction motor in which the primary winding is on the rotor and is connected to the supply through sliprings, and the secondary is on the stator. *See also:* asynchronous machine. (PE) [9]

inverted file (A) A file whose elements may be retrieved by searching either the primary key or secondary key of each record. *Note:* An inverted file is distinguished from other files by the logical relationship and organization of items and records. In an inverted file, each value of each data item in the records appears exactly once, instead of once in each record. *See also:* fully inverted file; partially inverted file; secondary index. **(B)** A file whose initial sequence has been reversed or whose contents may be searched in reverse order. (C) 610.5-1990

inverted input (oscilloscopes) An input such that the applied polarity causes a deflection polarity opposite from conventional deflection polarity. (IM) 311-1970w

inverted list (A) A list whose contents may be retrieved by searching either the primary key or the secondary key of each element. **(B)** A technique for organizing records in which the primary keys for records that have equivalent values for a given secondary key are stored in a secondary index. *Contrast:* multilist. *See also:* inversion. (C) 610.5-1990

inverted microstrip A compound planar transmission line consisting of one or more thin conducting strips of finite width

affixed to an insulating substrate of finite thickness and suspended above a single extended conducting ground plane with the strips facing the ground plane and separated from it by free space. The semi-infinite space above the substrate is also free space. (MTT) 1004-1987w

inverted strip dielectric waveguide A planar dielectric waveguide consisting of one or more dielectric strips of finite width affixed to an extended conducting ground plane on one side and to an extended dielectric layer of finite thickness and higher dielectric constant on the other side. (MTT) 1004-1987w

inverted-turn transposition (rotating machinery) A form of transposition used on multiturn coils in which one or more turns are given a 180-degree twist in the end winding or at the coil nose or series loop. *See also:* rotor; stator. (PE) [9]

inverter (1) A circuit or device whose output analog variable is equal in magnitude to its input analog variable, but is of opposite sign or polarity. (C) 610.10-1994w

(2) (electric power) A machine, device, or system that changes direct-current power to alternating-current power. *See also:* electronic analog computer; inverting amplifier. (IA/PEL/C/PE/ID/ET/EDPG/SPC) 10-1977, 995-1987w, 388-1992r, 165-1977w, 1020-1988r, 936-1987w

(3) Equipment that converts direct current (dc) to alternating current (ac). Any static power converter (SPC) with control, protection, and filtering functions used to interface an electric energy source with an electric utility system. *Notes:* 1. The term "inverter" is popularly used for the converter that serves as the interface device between the PV system dc output and the utility system. However, the definition for SPC more accurately describes this interface device. Because of popular usage, the term "inverter" is used throughout this recommended practice. It should be born in mind that this inverter includes the control, protection, and filtering functions as described in the definition for SPC. 2. Because of its integrated nature, the inverter is only required to be totally disconnected from the utility for service or maintenance. At all other times, whether the inverter is transferring PV energy to the utility or not, the control circuits remain connected to the utility to monitor utility conditions. The phrase "cease to energize the utility line" is used throughout this document to acknowledge that the inverter does not become totally disconnected from the utility when a trip function occurs, such as an overvoltage trip. The inverter can be completely disconnected from the utility for inverter maintenance by opening the ac-disconnect switch required by the NEC®. *Synonym:* static power converter. (SCC21) 929-2000

inverting amplifier (analog computer) An operational amplifier that produces an output signal of nominally equal magnitude and opposite algebraic sign to the input signal. *Note:* In an analog computer, the term inverter is synonymous with inverting amplifier. (C) 165-1977w

inverting parametric device A parametric device whose operation depends essentially upon three frequencies, a harmonic of the pump frequency and two signal frequencies, of which the higher signal-frequency is the difference between the pump harmonic and the lower signal frequency. *Note:* Such a device can exhibit gain at either of the signal frequencies provided power is suitably dissipated at the other signal frequency. It is said to be inverting because if one of the two signals is moved upward in frequency, the other will move downward in frequency. *See also:* parametric device. (ED) [46]

invisible range *See:* visible range.

Invocation The mapping of a parallel initiation of Activities of an Integral Activity Group that perform a distinct function and return to the initiating Activity. *Contrast:* Instance; Iteration. *See also:* mapping. (C/SE) 1074-1997

***in vitro* study** Referring to studies and/or effects that occur outside the living organism; e.g., within a test tube or Petri dish. (T&D/PE) 539-1990

***in vivo* study** Referring to studies and/or effects that occur within the body of living organisms. (T&D/PE) 539-1990

invoke To perform the actions described in 3.9.1.1of IEEE Std 1003.2-1992, except that searching for shell functions and special built-ins is suppressed. *See also:* execute. (C/PA) 9945-2-1993

invoked process That portion of an Integral Process that is called like a subroutine. (C/SE) 1074.1-1995

invoke ID An identifier used to distinguish one directory operation from all other outstanding operations. (C/PA) 1328.2-1993w, 1224.2-1993w, 1327.2-1993w, 1326.2-1993w

invoker identifier (IID) The specific element identifier (EID) of a responding transponder. (SCC32) 1455-1999

inward-wats service (telephone switching systems) A reverse-charge, flat-rate, or measured-time direct distance dialing service to a specific directory number. (COM) 312-1977w

I/O (1) (input/output) Input or output or both. (C) [20], [85]

(2) Input/output points. (SUB/PE) C37.1-1994

IOC *See:* input-output controller; integrated optical circuit.

I/O channel *See:* input-output channel.

I/O circuit *See:* input-output circuit.

I/O controller *See:* input-output controller.

ion (1) An electrically charged atom or radical. (IA) [59]

(2) The isolated atom, molecule, molecular cluster, or aerosol that by loss or gain of one or more electrons has acquired a net electric charge. *Note:* The inclusion of aerosols (particles) under this definition is consistent with historical usage. The use of the terms "small ion" and "charged aerosol" is encouraged. (T&D/PE) 539-1990, 1227-1990r

ion activity (ion species) The thermodynamic concentration, that is, the ion concentration corrected for the deviation from the law of ideal solutions. *Note:* The activity of a single ion species cannot, however, be measured thermodynamically. *See also:* ion. (EEC/PE) [119]

ion burn *See:* ion spot.

ion charge The resultant positive or negative charge of an ion, expressed as a multiple of the electron charge. (T&D/PE) 539-1990

ion charging (charge-storage tubes) Dynamic decay caused by ions striking the storage surface. *See also:* charge-storage tube. (ED) 158-1962w

ion concentration (species of ion) The concentration equal to the number of those ions, or of moles or equivalent of those ions, contained in a unit volume of an electrolyte. (EEC/PE) [119]

ion conduction current The portion of ion current resulting from ion transport due to the electric field. (T&D/PE) 539-1990

ion convection current The portion of ion current resulting from ion transport by fluid dynamic forces, such as wind. (T&D/PE) 539-1990

ion counter An instrument that determines monopolar space-charge density by measuring the charge collected from a known volume of air. (T&D/PE) 539-1990, 1227-1990r

ion current The flow of electric charge resulting from the motion of ions. (T&D/PE) 539-1990

ion exchange technique (fiber optics) A method of fabricating a graded index optical waveguide by an ion exchange process. *See also:* double crucible method; graded index profile; chemical vapor deposition technique. (Std100) 812-1984w

ion gun A device similar to an electron gun but in which the charged particles are ions. Example: proton gun. *See also:* electron optics. (ED) [45], [84]

ionic-heated cathode (electron tube) A hot cathode that is heated primarily by ionic bombardment of the emitting surface. (ED) 161-1971w, [45]

ionic-heated-cathode tube An electron tube containing an ionic-heated cathode. (ED) 161-1971w

ion implantation (A) (germanium gamma-ray detectors) (charged-particle detectors) A process in which a beam of energetic ions incident upon a solid results in the imbedding of those ions into the material. **(B)** A process in which a beam of energetic ions incident upon a solid results in the implantation of those ions into the material. (NPS) 325-1996, 300-1988

ion-implanted contact A detector contact consisting of a junction produced by the process of ion implantation. *See also:* ion implantation. (NPS) 325-1996, 300-1988r

ionization (1) (A) A breakdown that occurs in parts of a dielectric when the electric stress in those parts exceeds a critical value without initiating a complete breakdown of the insulation system. *Note:* Ionization can occur both on internal and external parts of a device. It is a source of radio noise and can damage insulation. **(B)** The process by which an atom or molecule receives enough energy (by collision with electrons, photons, etc.) to split it into one or more free electrons and a positive ion. Ionization is a special case of charging. (PE/IA/T&D/PL/APP) [8], [79], 539-1990

(2) (A) (outdoor apparatus bushings) The formation of limited avalanches of electrons developed in insulation due to an electric field. **(B) (outdoor apparatus bushings)** Ionization current is the result of capacitive discharges in an insulating medium due to electron avalanches under the influence of an electric field. *Note:* The occurrence of such currents may cause radio noise and/or damage to insulation. (PE/TR) 21-1976

(3) (corona measurement) Any process by which neutral molecules or atoms dissociate to form positively and negatively charged particles. (MAG/ET) 436-1977s

ionization current The electric current resulting from the movement of electric charges in an ionized medium, under the influence of an applied electric field. (SPD/PE) C62.11-1999

ionization extinction voltage (cable) (corona level) The minimum value of falling root-mean-square voltage that sustains electric discharge within the vacuous or gas-filled spaces in the cable construction or insulation. (PE) [4]

ionization factor (power distribution, underground cables) (dielectric) The difference between percent power factors at two specified values of electric stress. The lower of the two stresses is usually so selected that the effect of the ionization on power factor at this stress is negligible. (PE) [4]

ionization-gauge tube An electron tube designed for the measurement of low gas pressure and utilizing the relationship between gas pressure and ionization current. (ED) [45]

ionization measurement The measurement of the electric current resulting from the movement of electric charges in an ionized medium under the influence of the prescribed electric field. (PE/TR) 21-1976

ionization or corona detector *See:* discharge detector.

ionization or corona inception voltage *See:* discharge inception voltage.

ionization or corona probe *See:* discharge probe.

ionization smoke detector (fire protection devices) A device which has a small amount of radioactive material which ionizes the air in the sensing chamber, thus rendering it conductive and permitting a current flow through the air between two charged electrodes. This gives the sensing chamber an effective electrical conductance. When smoke particles enter the ionization area, they decrease the conductance of the air by attaching themselves to the ions, causing a reduction in mobility. When the conductance is less than the predetermined level, the detector circuit responds. (NFPA) [16]

ionization time (gas tube) The time interval between the initiation of conditions for and the establishment of conduction at some stated value of tube voltage drop. *Note:* To be exact the ionization time of a gas tube should be presented as a family of curves relating such factors as condensed-mercury temperature, anode and grid currents, anode and grid voltages, and regulation of the grid current. (ED) 161-1971w

ionization vacuum gauge A vacuum gauge that depends for its operation on the current of positive ions produced in the gas by electrons that are accelerated between a hot cathode and another electrode in the evacuated space. *Note:* It is ordinarily used to cover a pressure range of 10^{-4} to 10^{-10} conventional millimeters of mercury. *See also:* instrument. (EEC/PE) [119]

ionization voltage A high-frequency voltage appearing at the terminals of an arrester, generated by all sources, but particularly by ionization current within the arrester, when a power-frequency voltage is applied across the terminals. (SPD/PE) C62.11-1999

ionizing event (gas-filled radiation counter tube) Any interaction by which one or more ions are produced. (ED) 161-1971w

ionizing radiation (1) (A) (air) Particles or photons of sufficient energy to produce ionization in their passage through air. **(B) (air)** Particles that are capable of nuclear interactions with the release of sufficient energy to produce ionization in air. (NPS) 175-1960

(2) Particles or photons of sufficient energy to produce ionization in interactions with matter. (NI/NPS) 309-1999

ion migration A movement of ions in an electrolyte as a result of the application of an electric potential. *See also:* ion. (EEC/PE) [119]

ion mobility (1) The theoretical drift speed of a single, isolated ion in a liquid or gas, per unit electric field strength. The preferred unit is m^2/Vs; another commonly used unit is cm^2/Vs. Ion mobility depends on the ionic species. In air, several ionic species can exist simultaneously. (T&D/PE) 539-1990

(2) The drift speed of an ion in a liquid or gas per unit electric-field strength. The preferred unit is m^2/Vs; another commonly used unit is cm^2/Vs. (T&D/PE) 1227-1990r

ionogram A record showing the group path delay of ionospheric echoes as a function of frequency. (AP/PROP) 211-1997

ionosonde A swept-frequency or stepped frequency instrument that transmits radio waves vertically or obliquely to the ionosphere and uses the echoes to form an ionogram. (AP/PROP) 211-1997

ionosphere (1) (data transmission) That part of the earth's outer atmosphere where ions and free electrons are normally present in quantities sufficient to affect propagation of radio waves. (PE) 599-1985w

(2) That part of a planetary atmosphere where ions and free electrons are present in quantities sufficient to affect the propagation of radio waves. (AP/PROP) 211-1997

ionosphere disturbance A variation in the state of ionization of the ionosphere beyond the normally observed random day-to-day variation from average values for the location, date, and time of day under consideration. *Note:* Since it is difficult to draw the line between normal and abnormal viations, this definition must be understood in a qualitative sense. *See also:* radiation. (EEC/PE) [119]

ionosphere-height error (electronic navigation) The systematic component of the total ionospheric error due to the difference in geometrical configuration between ground paths and ionospheric paths. *See also:* navigation. (AES/RS) 686-1982s, [42]

ionospheric error (electronic navigation) The total systematic and random error resulting from the reception of the navigational signal via ionospheric reflections: this error may be due to variations in transmission paths, nonuniform height of the ionosphere, and nonuniform propagation within the ionosphere. *See also:* navigation. (AES/RS) 686-1982s, [42]

ionospheric absorption The loss of energy from an electromagnetic wave caused by collisions, primarily between electrons and neutral species and ions in the ionosphere. (AP/PROP) 211-1997

ionospheric mode of propagation Representation of a transmission path by the number of hops between the end points of the path, the ionospheric layers producing the ionospheric

reflections being indicated for each hop. For example, 1F + 1E represents a hop with an ionospheric reflection in the F region followed by a reflection at the ground, followed, in turn, by a hop with a reflection from the E region. *Synonym:* mechanism of propagation. (AP/PROP) 211-1997

ionospheric storm An ionospheric disturbance characterized by wide variations from normal in the state of the ionosphere, including effects such as turbulence in the F region, increases in absorption, and often decreases in ionization density and increases in virtual height. *Note:* The effects are most marked in high magnetic latitudes and are associated with abnormal solar activity. *See also:* radiation. (EEC/PE) [119]

ionospheric tilt error (electronic navigation) The component of the ionospheric error due to nonuniform height of the ionosphere. *See also:* navigation. (AES/RS) 686-1982s, [42]

ionospheric wave *See:* sky wave.

ion repeller (charge-storage tubes) An electrode that produces a potential barrier against ions. *See also:* charge-storage tube. (ED) 158-1962w

ion sheath *See:* electron sheath.

ion size Physical dimensions and mass of an ion. Ions are usually classified as small, medium, and large. *Note:* The radius and mass of an ion depend on the number and type of molecules in the cluster forming the ion. The diameter of an ion comprised of a *single* molecule is about 3×10^{-10} m. (T&D/PE) 539-1990

ion spot (A) (camera tubes or image tubes) The spurious signal resulting from the bombardment or alteration of the target or photocathode by ions. *See also:* television. **(B)** (cathode-ray-tube screen) An area of localized deterioration of luminescence caused by bombardment with negative ions. (ED/BT/AV) 161-1971, [34]

ion transfer (ionotherapy) (electrotherapy) (ion therapy) (iontophoresis) (ionic medication) (medical ionization) The forcing of ions through biological interfaces by means of an electric field. *See also:* electrotherapy. (EMB) [47]

ion trap (cathode-ray tubes) A device to prevent ion burn by removing the ions from the beam. *See also:* isolating transformer.

IOP *See:* input-output processor.

I/O port *See:* input-output port.

I/O processor *See:* input-output processor.

I/O space The address space used for accessing peripheral devices such as communication controllers and mass storage devices. (C/MM) 1296-1987s

I/O transaction An instance of activity between Functions, usually composed of an Initiation and a Completion, although not necessarily bound one to one. A disk read and network data delivery are examples of I/O transactions. (C/MM) 1212.1-1993

I/O Unit memory Memory that is located in the I/O Unit. For most purposes in this document, the externally visible locations may interchangeably be in either the initial node space (4 kbytes) or unit-extension (or even the memory-extension) areas defined in IEEE Std 1212-1991. (C/MM) 1212.1-1993

Ip *See:* peak current.

IPG *See:* Inter-Packet Gap.

IPL *See:* Information Processing Language.

IPM *See:* invalid packet marker.

IPO chart *See:* input-process-output chart.

IPSE *See:* programming support environment.

$I_p \cdot T$ product (as applicable to transformers) The $I \cdot T$ product measured in the primary of a transformer when the secondary is open-circuited. It is abbreviated as $I_p \cdot T$. (COM/TA) 469-1988w

IR *See:* interrogator-respondor; infrared.

IRA *See:* laser gyro axes.

IRC *See:* information center; information resource center.

IR drop (electrolytic cells) The drop equal to the product of the current passing through the cell and the resistance of the cell. (EEC/PE) [119]

IR-drop compensation transformer (power and distribution transformers) A provision in the transformer by which the voltage drop due to transformer load current and internal transformer resistance is partially or completely neutralized. Such transformers are suitable only for one-way transformation, that is, not interchangeable for step-up and step-down transformations. (PE/TR) C57.12.80-1978r

Iref *See:* reference current.

iris (1) (waveguide technique) A metallic plate, usually of small thickness compared with the wavelength, perpendicular to the axis of a waveguide and partially blocking it. *Notes:* 1. An iris acts like a shunt element in a transmission line: it may be inductive, capacitive, or resonant. 2. When only a single mode can be supported an iris acts substantially as a shunt admittance. (AP/ANT) [35]

(2) (waveguide components) A partial obstruction at a transverse cross-section formed by one or more metal plates of small thickness compared with the wavelength. (MTT) 147-1979w

(3) (laser maser) The circular pigmented membrane which lies behind the cornea of the human eye. The iris is perforated by the pupil. (LEO) 586-1980w

IRL *See:* inter-repeater link.

IRM *See:* isochronous resource manager.

ironclad plate (storage cell) A plate consisting of an assembly of perforated tubes of insulating material and of a centrally placed conductor. *Note:* "Ironclad" is a registered trademark of ESB Incorporated. *See also:* battery. (PE/EEC) [119]

irradiance (1) (laser maser) (at a point of a surface) (E) Quotient of the radiant flux incident on an element of the surface containing the point by the area of that element. Unit: $W \cdot cm^{-2}$. (LEO) 586-1980w

(2) (fiber optics) Radiant power incident per unit area upon a surface, expressed in watts per square meter. "Power density" is colloquially used as a synonym. *See also:* radiometry. (Std100) 812-1984w

irrational number A real number that is not a rational number. *Contrast:* rational number. (C) 610.5-1990w

irreversible dark current increase (diode-type camera tube) That dark current increase which results from irradiation of the target by soft x rays. (ED) 503-1978w

irreversible process An electrochemical reaction in which polarization occurs. *See also:* electrochemistry. (EEC/PE) [119]

irreversible target dark current increase (diode-type camera tube) That dark current increase which is permanent and increases with hours of operation. (ED) 503-1978w

irrigation machines An irrigation machine is an electrically driven or controlled machine, with one or more motors, not hand portable, and used primarily to transport and distribute water for agricultural purposes. (NESC/NEC) [86]

IS *See:* information separator.

ISA instruction set architecture. (C/BA) 14536-1995

ISAM *See:* indexed sequential access method.

ISAR *See:* inverse-synthetic-aperture radar.

I-scope A cathode-ray oscilloscope arranged to present an I-display. *See also:* I-display. (AES/RS) 686-1990

ISD *See:* interrupt service device.

I-series A series of ISDN standards reccommended by CCITT. (C) 610.10-1994w

ISI *See:* information services interface.

island (1) An operating part of a DQDB *subnetwork* that is isolated from the node containing the *default slot generator function.* (LM/C) 8802-6-1994

(2) That part of a power system consisting of one or more power sources and load that is, for some period of time, separated from the rest of the system. (SWG/PE) C37.100-1992

island effect (electron tube) The restriction of the emission from the cathode to certain small areas of it (islands) when the grid voltage is lower than a certain value. (Std100) [84]

islanding (1) (utility-interconnected static power converters) Operation of the power converter and part of the utility load while isolated from the remainder of the electric utility system. (DESG) 1035-1989w

(2) (windfarm generating stations) Operation of non-utility electric generation equipment, with or without a portion of an electric utility system, isolated from the remainder of the utility system. (DESG) 1094-1991w

(3) A condition in which a portion of the utility system that contains both load and distributed resources remains energized while isolated from the remainder of the utility system. (SCC21) 929-2000

ISM apparatus (industrial, scientific, and medical apparatus; electromagnetic compatibility) Apparatus intended for generating radio-frequency energy for industrial, scientific or medical purposes. *See also:* electromagnetic compatibility. (INT) [53], [70]

ISO *See:* International Organization for Standardization.

isocandela line (illuminating engineering) A line plotted on any appropriate set of coordinates to show directions in space, about a source of light, in which the intensity is the same. A series of such curves, usually for equal increments of intensity, is called an isocandela diagram. (EEC/IE) [126]

isoceraunic map *See:* isokeraunic map.

isochronous (1) The time characteristic of an event or signal recurring at known, periodic time intervals. (LM/C) 8802-6-1994

(2) A communication stream transport that is uniform in time. The delivery of the physical stream of information is recurring at regular intervals. (C/LM/COM) 802.9a-1995w, 8802-9-1996

(3) The essential characteristic of a time-scale or a signal such that the time intervals between consecutive significant instances either have the same duration or durations that are integral multiples of the shortest duration. (C/MM) 1394-1995

(4) Uniform in time (i.e., having equal duration) and recurring at regular intervals. (C/MM) 1394a-2000

isochronous channel A relationship between a talker and one or more listeners, identified by a channel number. One packet for each channel is sent during each isochronous cycle. Channel numbers are assigned using the isochronous resource management facilities. (C/MM) 1394-1995

isochronous cycle An operating mode of the bus that begins after a cycle start is sent, and ends when a subaction gap is detected. During an isochronous cycle, only isochronous subactions may occur. An isochronous cycle begins every 125 μs, on average. (C/MM) 1394-1995

isochronous gap (1) The period of idle bus before the start of arbitration for an isochronous subaction. (C/MM) 1394-1995

(2) For an isochronous subaction, the period of idle bus that precedes arbitration. (C/MM) 1394a-2000

isochronous period A period that begins after a cycle start packet is sent and ends when a subaction gap is detected. During an isochronous period, only isochronous subactions may occur. An isochronous period begins, on average, every 125 μs. (C/MM) 1394a-2000

isochronous resource manager (1) The node that contains the facilities needed to manage isochronous resources. In particular, the isochronous resource manager includes the BUS_ MANAGER_ID, BANDWIDTH_AVAILABLE, and CHANNELS_AVAILABLE registers. In addition, if there is no bus manager on the local bus, the isochronous resource manager may also perform limited power management and select a node to be the cycle master. (C/MM) 1394-1995

(2) A node that implements the BUS_MANAGER_ID, BANDWIDTH_AVAILABLE, CHANNELS_AVAILABLE and BROADCAST_CHANNEL registers (some of which permit the cooperative allocation of isochronous resources). Subsequent to each bus reset, one isochronous resource manager is selected from all nodes capable of this function. (C/MM) 1394a-2000

isochronous service octet A single octet of data passed isochronously between the DQDB layer and the isochronous service user (ISU). (LM/C) 8802-6-1994

isochronous service user (ISU) The entity that uses the isochronous service provided by the DQDB layer to transfer isochronous service octets over an established isochronous connection. (LM/C) 8802-6-1994

isochronous speed governing (gas turbines) Governing with steady-state speed regulation of essentially zero magnitude. (PE/EDPG) [5], 282-1968w

isochronous subaction (1) A complete link layer operation (arbitration and isochronous packet) that is sent only during an isochronous cycle. (C/MM) 1394-1995

(2) Within the isochronous period, either a concatenated packet or a packet and the gap that preceded it. (C/MM) 1394a-2000

isocon mode (camera tubes) A low-noise return-beam mode of operation utilizing only back-scattered electrons from the target to derive the signal, with the beam electrons specularly reflected by the electrostatic field near the target being separated and rejected. *See also:* camera tube. (ED) [45]

isoelectric point A condition of net electric neutrality of a colloid, with respect to its surrounding medium. *See also:* ion. (EEC/PE) [119]

isokeraunic level (lightning) The average annual number of thunderstorm days. *See also:* direct-stroke protection. (T&D/PE) [10]

isokeraunic lines Lines on a map connecting points having the same keraunic level. (SUB/PE) 998-1996

isokeraunic map A map showing equal levels of thunderstorm activity. Usually shown in mean annual days of thunderstorm activity. *Synonym:* isoceraunic map. *See also:* keraunic level. (T&D/PE) 751-1990

isolated (A) Physically separated, electrically and mechanically, from all sources of electrical energy. Such separation may not eliminate the effects of electrical induction. **(B)** Not readily accessible to persons unless special means for access are used. (PE/T&D/IA/NESC/PC) 516-1987, 524-1992, 1048-1990, 458-1990, [86], 463-1977, C2.2-1960, C2-1997

isolated bonding network (IBN) (A) A bonding network that has a single point of connection (single-point ground) to either the common bonding network (CBN) or another isolated bonding network. **(B)** Typically a system-level grounding topology used by the original equipment manufacturer (OEM) to desensitize its equipment to suspected or known site environmental issues such as power fault and surge, lightning, and grounding potential rise. The IBN requires the use of a single-point connection location (also known in the telephone industry as a *ground window*) to interface the rest of the building metallics (the CBN). *Note:* The IBN may also be known in the public telephone network as an *isolated ground plane*. (IA/PSE) 1100-1999

isolated by elevation Elevated sufficiently so that persons may safely walk underneath. (NESC) C2-1997

isolated capacitor bank A capacitor bank that is not in parallel with other capacitor banks. (T&D/PE) 1036-1992

isolated conductor (ignored conductor) In a multiple-conductor system, a conductor either accessible or inaccessible, the charge of which is not changed and to which no connection is made in the course of the determination of any one of the capacitances of the remaining conductors of the system. (Std100) 270-1966w

isolated equipment ground An isolated equipment grounding conductor runs in the same conduit or raceway as the supply conductors. This conductor is insulated from the metallic

raceway and all ground points throughout its length. It originates at an isolated-ground-type receptacle or equipment input terminal block and terminates at the point where neutral and ground are bonded at the power source. (IA/PSE) 1100-1999

isolated impedance (of an array element) The input impedance of a radiating element of an array antenna with all other elements of the array absent. (AP/ANT) 145-1993

isolated-neutral system A system that has no intentional connection to ground except through indicating, measuring, or protective devices of very-high impedance. *See also:* grounded system. (PE) [8], [84]

isolated node A node without active ports; the node's ports may be disabled, disconnected, or suspended in any combination. (C/MM) 1394a-2000

isolated patient lead (health care facilities) A patient lead whose impedance to ground or the power line is sufficiently high that connecting the lead to ground, or to either conductor of the power line, results in current flow in the lead which is below a hazardous limit. (EMB) [47]

isolated-phase bus (1) (generating station grounding) A metal-enclosed bus in which each phase conductor is enclosed by an individual metal housing separated from adjacent conductor housings by an air space. (PE/EDPG) 665-1995 **(2)** A bus in which each phase conductor is enclosed by an individual metal housing separated from adjacent conductor housings by an air space. *Note:* The bus may be self-cooled or may be forced-cooled by means of circulating a gas or liquid. (SWG/PE) C37.100-1992

isolated plant (electric power) An electric installation deriving energy from its own generator driven by a prime mover and not serving the purpose of a public utility. (EEC/PE) [119]

isolated power system A system comprising an isolating transformer or its equivalent, a line isolation monitor, and its ungrounded circuit conductors. (NEC/NESC/EMB) [86], [47]

isolated redundant UPS configuration Uses a combination of automatic transfer switches and a reserve system to serve as the bypass source for any of the active systems. (IA/PSE) 241-1990r

isolating amplifier (signal-transmission system) An amplifier employed to minimize the effects of a following circuit on the preceding circuit. *Example:* An amplifier having effective direct-current resistance and/or alternating-current impedance between any part of its input circuit and any other of its circuits that is high compared to some critical resistance or impedance value in the input circuit. *See also:* signal. (IE) [43]

isolating contactor (power system device function numbers) A device that is used expressly for disconnecting one circuit from another for the purposes of emergency operation, maintenance, or test. (PE/SUB) C37.2-1979s

isolating device A device in a circuit that prevents malfunction in one section of a circuit from causing acceptable influences in other sections of the circuit or other circuits. (PE/NP) 308-1991

isolating switch (A) A switch intended for isolating an electric circuit from the source of power. It has no interrupting rating, and it is intended to be operated only after the circuit has been opened by some other means. **(B)** Device used to isolate plant electrical equipment from the rest of the circuit. (NESC/NEC/PE/EDPG) [86], 1020-1988

isolating time (of a sectionalizer) The time between the cessation of a current above the minimum actuating current value that caused the final counting and opening operation and the maximum separation of the contacts. (SWG/PE) C37.100-1992

isolating transformer (electroacoustics) A transformer inserted in a system to separate one section of the system from undesired influences of other sections. *Note:* Isolating transformers are commonly used to isolate system grounds and prevent the transmission of undesired currents. (SP/IE) 151-1965w, [43]

isolating (insulating) transformers Transformers that provide longitudinal (common mode) isolation of the telecommunication facility. They can be designed for use in a combined isolating-drainage transformer configuration and also can be designed for a low longitudinal to metallic conversion. *Synonym:* insulating transformer. (PE/PSC) 487-1992

isolating transformers with high-voltage isolating relays An assembly that provides protection for standard telephone service and consists basically of an isolating transformer and a high-voltage isolating relay. The transformer provides a path for voice and ringing frequencies while the relay provides a means for repeating dc signals around the transformer. A locally supplied battery or dc power supply is required for operation of the telephone and relay. (PE/PSC) 487-1992

isolation (1) (A) (nonlinear, active, and nonreciprocal waveguide components) *circulator.* The ratio of insertion loss to an isolated port relative to insertion loss to the coupled port in a circulator. **(B) (nonlinear, active, and nonreciprocal waveguide components)** *ferrite isolator.* The ratio of insertion loss in the reverse direction to insertion loss in the forward direction in an isolator. **(C) (nonlinear, active, and nonreciprocal waveguide components)** *mixer.*The degree to which the amplitude of an undesired wave is suppressed relative to the amplitude of the desired wave. **(D) (nonlinear, active, and nonreciprocal waveguide components)** *switch.* The ratio of insertion loss in the OFF (open) state to the insertion loss in the ON (closed) state in a switch. (ELM) C12.9-1982 **(2)** A measure of power transfer from one antenna to another. *Note:* The isolation between antennas is the ratio of power input to one antenna to the power received by the other, usually expressed in decibels. *See also:* radiation. (AP/ANT) 145-1993 **(3)** Separation of one section of a system from undesired influences of other sections. (IA/PSE) 1100-1999

isolation amplifier (buffer) An amplifier employed to minimize the effects of a following circuit on the preceding circuit. *See also:* amplifier. (BT/AV) [34]

isolation between antennas A measure of power transfer from one antenna to another. *Note:* The isolation between antennas is the ratio of power input to one antenna to the power received by the other, usually expressed in decibels. *See also:* radiation. (AP/ANT) 145-1993

isolation boundary (periodic testing of diesel-generator units applied as standby power supplies in nuclear power generating stations) A supporting system, subsystem, or device (valve, control power circuit breaker, switch, etc.) which provides a boundary with the diesel-generator unit. Failures of the device or the supporting system, or subsystem are not considered diesel-generator unit failures. (PE/NP) 749-1983w

isolation by elevation *See:* isolated by elevation.

isolation device (Class 1E equipment and circuits) (nuclear power generating station) A device in a circuit that prevents malfunctions in one section of a circuit from causing unacceptable influences in other sections of the circuit or other circuits. (PE/NP) 380-1975w, 384-1992r

isolation transformer (1) (health care facilities) A transformer of the multiple-winding type, with the primary and secondary windings physically separated, which inductively couples its ungrounded secondary winding to the grounded feeder system that energizes its primary winding. (EMB) [47] **(2) (health care facilities)** A transformer of the multiple-winding type, with the primary and secondary windings physically separated, that inductively couples its secondary winding to the grounded feeder systems that energize its primary winding, thereby preventing primary circuit potential from

being impressed on the secondary circuits. (NESC/NEC) [86]

isolation voltage (power supplies) A rating for a power supply that specifies the amount of external voltage that can be connected between any output terminal and ground (the chassis). This rating is important when power supplies are connected in series. (AES) [41]

isolation zone Any area, adjacent to a perimeter physical barrier, cleared of objects that could conceal or shield an individual. The inner isolation zone is inside of the perimeter physical barrier; the outer isolation zone is outside of the perimeter physical barrier. (PE/NP) 692-1997

isolator (1) (SWG)
(2) (waveguide) A passive attenuator in which the loss in one direction is much greater than that in the opposite direction. *See also:* waveguide. [84]
(3) (fiber optics) A device intended to prevent return reflections along a transmission path. *Note:* The Faraday isolator uses the magneto-optic effect. (Std100) 812-1984w

isolator, optical *See:* optical isolator.

isolux (isofootcandle) line (illuminating engineering) A line plotted on any appropriate set of coordinates to show all the points on a surface where the illuminance is the same. A series of such lines for various illuminance values is called an isolux (isofootcandle) diagram. (EEC/IE) [126]

isophase *See:* equal interval (isophase) light.

isopreference (speech quality measurements) Two speech signals are isopreferent when the votes averaged over all listeners show an equal preference for the speech test and speech reference signals. 297-1969w

ISO Standard A standard approved and published by International Organization for Standardization. (C) 610.7-1995

isothermal (electric power systems in commercial buildings) A process that occurs at a constant temperature. (IA/PSE) 241-1990r

isotropic (fiber optics) Pertaining to a material whose electrical or optical properties are independent of direction of propagation and of polarization of a traveling wave. *See also:* birefringent medium; anisotropic. (Std100) 812-1984w

isotropic radiator A hypothetical, lossless antenna having equal radiation intensity in all directions. *Note:* An isotropic radiator represents a convenient reference for expressing the directive properties of actual antennas. (AP/ANT) 145-1993

isotropic scatterer A non-physical scatterer that scatters equally in all directions. (AP/PROP) 211-1997

ISTE *See:* integrated services terminal equipment.

$I_s \cdot T$ product (as applicable to transformers) The $I \cdot T$ product measured in the secondary (low voltage) of a transformer when the primary (high voltage) is open-circuited. It is abbreviated as $I_s \cdot T$. (COM/TA) 469-1988w

ISU *See:* isochronous service user.

IT *See:* Internal Translator.

ITA *See:* interface test adapter.

item (1) (nuclear power generating station) Any level of unit assembly, including structure, system, subsystem, subassembly, module, component, part, equipment or material. *Note:* This term applies specifically to the subject matter of IEEE Std 467-1980. (PE/NP) 467-1980w
(2) (nuclear power quality assurance) An all-inclusive term used in place of any of the following: appurtenance, assembly, component, equipment, material, module, part, structure, subassembly, subsystem, system, or unit. (PE/NP) [124]
(3) (computers) A collection of related characters, treated as a unit. *See also:* file. (C) [85]
(4) An all-inclusive term to denote any level of hardware assembly: that is, system, segment of a system, subsystem, equipment, component, part, etc. *Note:* Item includes items, population of items, sample, etc., where the context of its use so justifies. *See also:* reliability. (R) [29]
(5) (data management) One member of a group; for example, a field in a record or a record in a file. *See also:* data item. (C) 610.5-1990w

item condition A disjunction of two or more atomic conditions such that the name of the data item is the same in each atomic condition. For example, "LASTNAME = 'JONES' or LASTNAME = 'SMITH' or LASTNAME = 'GREEN.' ". *Note:* The disjunction may be implied, as in the example "LASTNAME = ('JONES','SMITH','GREEN' "). *See also:* record condition. (C) 610.5-1990w

item, nonrepaired *See:* nonrepaired item.

item or equipment hazard rate (reliability data for pumps and drivers, valve actuators, and valves) The instantaneous failure rate of an item or equipment or its conditional probability of failure versus time. (PE/NP) 500-1984w

item, repaired *See:* repaired item.

Iteration The mapping of any execution of an Activity where at least some Input Information is processed and some Output Information is created. One or more Iterations comprise an Instance. *Contrast:* Instance; Invocation. *See also:* mapping. (C/SE) 1074-1997

iteration (A) (software) The process of performing a sequence of steps repeatedly. *See also:* loop; recursion. **(B) (software)** A single execution of the sequence of steps in definition (A). (C) 610.12-1990

iterative (test, measurement, and diagnostic equipment) Describing a procedure or process which repeatedly executes a series of operations until some condition is satisfied. An iterative procedure may be implemented by a loop in a routine. (MIL) [2]

iterative construct *See:* loop.

iterative document A document that will be produced multiple times with relatively few changes in the text. For example, a letter meant to be prepared 100 times, each with a different name and address in the salutation. *Synonym:* form letter. (C) 610.2-1987

iterative impedance (transducer or a 2-port network) The impedance that, when connected to one pair of terminals, produces a like impedance at the other pair of terminals. *Notes:* 1. It follows that the iterative impedance of a transducer or a network is the same as the impedance measured at the input terminals when an infinite number of identically similar units are formed into an iterative or recurrent structure by connecting the output terminals of the first unit to the input terminals of the second, the output terminals of the second to the input terminals of the third, etc. 2. The iterative impedances of a four-terminal transducer or network are, in general, not equal to each other but for any symmetrical unit the iterative impedances are equal and are the same as the image impedances. The iterative impedance of a uniform line is the same as its characteristic impedance. (SP/IM/HFIM) 151-1965w, [40]

iterative operation (analog computer) Similar in many respects to repetitive operation, except that the automatic recycling of the computer is controlled by programmed logic circuits, which generally include a program change for a parameter(s), variable(s), or combinations of these between successive solutions, resulting in an iterative process which tends to converge on desired values of the parameter(s) or variables(s) that have been changed. *See also:* repetitive operation. (C) 165-1977w

ITP *See:* inspection and test plan.

***I · T* product** The inductive influence expressed in terms of the product of its root-mean-square magnitude (I), in amperes, times its telephone influence factor (TIF). (COM/IA/SUB/PE/TA/SPC) 469-1988w, 519-1992, 1303-1994

I · *T* product kV · *T* product (voice-frequency electrical-noise test) Inductive influence usually expressed in terms of the product of its root-mean-square magnitude in kilovolts times its telephone influence factor (TIF), abbreviated as kV · T product. (COM/TA) 469-1977s

ITRV *See:* initial transient recovery voltage.

ITU-TSS *See:* X.200; X.25; V-series; X-series; International Telecommunication Union-Telecommunications Standardization Sector; X.400; X.75.

I-unit *See:* instruction fetch unit.

IV *See:* initialization vector.

***I* Video Signal (National Television System Committee color television)** One of the two video signal (E'_{I} and E'_{Q}) controlling the chrominance in the NTSC system. *Note:* It is a linear combination of gamma-corrected primary color signals, E'_{R}, E'_{G}, and E'_{B} as follows:

$$E'_I = -0.27(E'_B - E'_Y) + 0.74(E'_R - E'_Y)$$
$$= 0.60E'_R - 0.28E'_G - 0.32E'_B$$

(BT/AV) 201-1979w

IVV *See:* independent verification and validation.

IWU *See:* interworking unit.

IXC *See:* interexchange carrier; interexchange channel.