H

H *See:* H beacon.

HAL (A) A high-order problem-oriented language used in aerospace applications; characterized by its strong orientation toward mathematical computations and built-in vector/matrix arithmetic. **(B)** Abbreviation for High-order Ada Language; a computer language similar to Ada. (C) 610.13-1993

halation (cathode-ray tubes) An annular area surrounding a spot, that is due to the light emanating from the spot being reflected from the front and rear sides of the face plate. *See also:* cathode-ray tube. (Std100) [84]

half-adder A combinational logic element having two outputs, S and C, and two inputs, A and B, such that the outputs are related to the inputs according to the following equations:

$S = A \text{OR} B$ (exclusive OR)

$C = A + B$

S denotes sum without carry, C denotes carry. Two half-adders may be used for performing binary addition. (C) [20]

half adder An adder that accepts two inputs, producing a sum and a carry as outputs according to the table below. *Synonym:* two-input adder. *Contrast:* quarter adder; full adder. *See also:* half subtracter.

input #1	0	0	1	1
input #2	0	1	0	1
output sum	0	1	1	0
output carry	0	0	0	1

half adder

(C) 610.10-1994w

half-adjust (mathematics of computing) To round a number by changing the least significant digit to zero and adding one to the next digit if the value of the least significant digit was half the radix or greater. (C) 1084-1986w

half-amplitude recovery time The time interval from the start of a full-amplitude pulse to the instant a succeeding pulse can attain an amplitude of 50% of the maximum amplitude of a full-amplitude pulse. (NI/NPS) 309-1999

half carry (mathematics of computing) A carry process in which a carry digit generated in the most significant digit place of the less-significant half of a sum is transferred to the least significant digit place of the more significant half. (C) 1084-1986w

half cell An electrode immersed in a suitable electrolyte. *See also:* electrolytic cell. (EEC/PE) [119]

half coil *See:* armature bar.

half duplex (1) (data transmission) Pertaining to a transmission over a circuit capable of transmitting in either direction, but only one direction at a time. (COM/PE) 599-1985w

(2) Transmission over a circuit capable of transmitting in either direction, but only in one direction at a time. *Contrast:* duplex. (SUB/PE) 999-1992w

(3) A mode of operation of a CSMA/CD local area network (LAN) in which DTEs contend for access to a shared medium. Multiple, simultaneous transmissions in a half duplex mode CSMA/CD LAN result in interference, requiring resolution by the CSMA/CD access control protocol. (C/LM) 802.3-1998

(4) (local area networks) A link segment capable of transferring signals in either direction along the link, but not in both directions simultaneously. Requires line turnaround to change signal direction. (4-UTP links are full duplex in control mode, but only half duplex in data mode.). (C) 8802-12-1998

(5) An operating condition that allows communication in either send and receive directions with more than 20 dB switched loss in either direction. (COM/TA) 1329-1999

half-duplex channel (data transmission) (half duplex operation) A channel of a duplex system arranged to permit operation in either direction but not in both directions simultaneously. (PE) 599-1985w

half-duplex operation (telegraph system) Operation of a duplex system arranged to permit operation in either direction but not in both directions simultaneously. *See also:* telegraphy. (EEC/PE) [119]

half-duplex repeater A duplex telegraph repeater provided with interlocking arrangements that restrict the transmission of signals to one direction at a time. *See also:* telegraphy. (EEC/PE) [119]

half-duplex transmission Transmission in which data may be sent in either direction but only in one direction at a time on a transmission medium. *Contrast:* simplex transmission; duplex transmission. (C) 610.7-1995

half-height disk drive A disk drive that uses the same width, but approximately one-half the front panel height as a standard disk drive, known as a full-height disk drive. (C) 610.10-1994w

half-power beamwidth In a radiation pattern cut containing the direction of the maximum of a lobe, the angle between the two directions in which the radiation intensity is one-half the maximum value. *See also:* principal half-power beamwidths. (AP/ANT) 145-1993

half section A bisected tee or pi section. A basic L-section building block of image-parameter filters. (CAS) [13]

half subtracter A subtracter that accepts two inputs, producing a sum and a borrow digit as output according to the table below. *Contrast:* full subtracter. *See also:* half adder.

input #1	0	0	1	1
input #2	0	1	0	1
output sum	0	1	1	0
output carry	0	1	0	0

half subtracter

(C) 610.10-1994w

halftone characteristic (facsimile) A relation between the density of the recorded copy and the density of the subject copy. *Note:* The term may also be used to relate the amplitude of the facsimile signal to the density of the subject copy or the record copy when only a portion of the system is under consideration. In a frequency-modulation system an appropriate parameter is to be used instead of the amplitude. *See also:* recording. (COM) 168-1956w

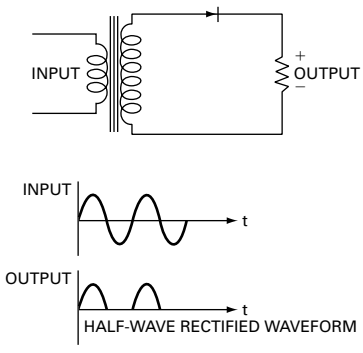
halftones *See:* level; storage tube.

halftoning (computer graphics) A technique for displaying an image with many gray levels on a monochrome display device in which the gray levels are approximated by variable-sized black and white dots. *See also:* dithering. (C) 610.6-1991w

half-wave dipole A wire antenna consisting of two straight collinear conductors of equal length, separated by a small feeding gap, with each conductor approximately a quarter-wavelength long. *Note:* This antenna gets its name from the fact that its overall length is approximately a half-wavelength. In practice, the length is usually slightly smaller than a half-wavelength—enough to cause the input impedance to be pure real ($jX = 0$). (AP/ANT) 145-1993

half-wave rectification (power supplies) In the rectifying process, half-wave rectification passes only one-half of each incoming sinusoid, and does not pass the opposite half-cycle. The output contains a single half-sine pulse for each input cycle. A single rectifier provides half-wave rectification. Because of its poorer efficiency and larger alternating-current component, half-wave rectification is usually employed in

noncritical low-current circumstances. See the accompanying figure. *See also:* rectifier circuit element; rectification; rectifier.



half-wave rectification

(AES) [41]

halfword (1) An aligned **doublet.** *Note:* The definition of this term is architecture-dependent, and so may differ from that used in other processor architectures. (C/MM) 1754-1994

(2) A contiguous sequence of bits or characters that comprises half of a computer word and which is capable of being addressed as a unit. (C) 610.10-1994w

(3) For the purpose of this standard, a half-word is a 16-bit data item taken as a unit. (C/MM) 1196-1987w

(4) Two bytes or 16 bits operated on as a unit. The most significant byte carries the index value 0 and the least significant byte carries the index value 1. (C/BA) 1496-1993w

half-word Slave An SBus Slave having a data path only through bits D[31:16] of the data bus. (C/BA) 1496-1993w

Hall analog multiplier A Hall multiplier specifically designed for analog multiplication purposes. (MAG) 296-1969w

Hall angle The angle between the electric field vector and the current density vector. (MAG) 296-1969w

Hall coefficient The coefficient of proportionality R in the relation

$$\boldsymbol{E}_{\mathrm{H}} = R(\boldsymbol{J} \times \boldsymbol{B})$$

where
$\boldsymbol{E}_{\mathrm{H}}$ is the resulting transverse electric field
$\boldsymbol{J}$ is the current density
$\boldsymbol{B}$ is the magnetic flux density

Note: The sign of the majority carrier charge can usually be inferred from the sign of the Hall coefficient.

(MAG) 296-1969w

Hall effect (A) (Hall effect devices) *(in conductors and semiconductors).* The change of the electric conduction caused by that component of the magnetic field vector normal to the current density vector, which, instead of being parallel to the electric field, forms an angle with it. *Note:* In conductors and semiconductors of noncubic single crystals, the current density and electric field vectors may not be parallel in the absence of an applied magnetic field. For such crystals the more general definition below should be used. **(B) (Hall effect devices)** *(in any material, including ferromagnetic and similar materials).* The change of the electric conduction caused by that component of the magnetic field vector applied normal to the current density vector, which causes the angle between the current density vector and the electric field to change from the magnitude that existed prior to the introduction of the magnetic field. *Note:* For ferromagnetic and similar materials there are two effects, the "ordinary" Hall effect due to the applied external magnetic flux as described for conductors and semiconductors and the "extraordinary" Hall effect due to the magnetization in the ferromagnetic or similar material. In the absence of the "extraordinary" Hall effect and the effects outlined in the preceding note, the current density vector and the electric field vector will be parallel when there is no external magnetic flux. (MAG) 296-1969

Hall effect device A device in which the Hall effect is utilized. (MAG) 296-1969w

Hall-effect probe A magnetic flux density sensor containing an element exhibiting the Hall-effect to produce a voltage proportional to the magnetic flux density. *Note:* Hall-effect probes respond to static as well as time varying magnetic flux densities. Due to saturation problems sometimes encountered when attempting to measure small power frequency flux densities in the presence of the substantial static geomagnetic flux of the earth, Hall-effect probes have seldom been used under ac power lines. (T&D/PE) 539-1990, 1308-1994

Hall generator A Hall plate, together with leads, and, where used, encapsulation and ferrous or nonferrous backing plate(s). (MAG) 296-1969w

Hall mobility (electric conductor) The quantity μH in the relation $\mu H = R\sigma$, where R = Hall coefficient and σ = conductivity. *See also:* semiconductor. (ED) 216-1960w

Hall modulator A Hall effect device that is specifically designed for modulation purposes. (MAG) 296-1969w

Hall multiplier A Hall effect device that contains a Hall generator together with a source of magnetic flux density and that has an output that is a function of the product of the control current and the field excitation current. (MAG) 296-1969w

Hall plate A three-dimensional configuration of any material in which the Hall effect is utilized. (MAG) 296-1969w

Hall probe A Hall effect device specifically designed for measurement of magnetic flux density. (MAG) 296-1969w

Hall terminals The terminals between which the Hall voltage appears. (MAG) 296-1969w

Hall voltage The voltage generated in a Hall plate due to the Hall effect. (MAG) 296-1969w

halogen-quenched counter tube A self-quenched counter tube in which the quenching agent is a halogen, usually bromine or chlorine. (ED) [45]

halt (A) Most commonly, a synonym for **stop. (B)** Less commonly, a synonym for **pause.** (C) 610.12-1990

halt instruction *See:* pause instruction.

halving interval (thermal classification of electric equipment and electrical insulation) (evaluation of thermal capability) The number corresponding to the interval in °C determined from the thermal endurance relationship expresses the halving of the time-to-end-point centered on the temperature of the TI or RTI. In case of graphical derivation the times corresponding to the TI or RTI (for example, 20 000 h) and one half that value (for example, 10 000 h) will usually produce an acceptable approximation. *See also:* thermal endurance graph. (EI) 1-1986r

hamming code (mathematics of computing) Any of several error-correcting codes invented by the mathematician Richard Hamming, which use redundant information bits to detect and correct any single error in a transmitted character. *See also:* error-correcting code. (C) 610.7-1995, 1084-1986w

hamming distance (1) (mathematics of computing) The number of digit positions in which two binary numerals, characters, or words of the same length are different. For example, the Hamming distance between 100101 and 101001 is two. *Synonyms:* signal distance; code distance. (C) 1084-1986w

(2) The minimum number of incorrect bits that shall be received in order for a packet to be considered invalid. For example, the hamming distance 4 means that all one-, two-, and three-bit errors are detectable. (PE/SUB) 1379-1997

hand (head or butt) cable (mining) A flexible cable used principally in making electric connections between a mining machine and a truck carrying a reel of portable cable. *See also:* mine feeder circuit. (EEC/PE) [119]

hand burnishing (electroplating) Burnishing done by a hand tool, usually of steel or agate. *See also:* electroplating. (EEC/PE) [119]

hand elevator An elevator utilizing manual energy to move the car. *See also:* elevator. (EEC/PE) [119]

hand-feed punch A card punch into which cards are manually entered and removed one at a time. *Synonym:* hand punch. *Contrast:* automatic-feed punch. (C) 610.10-1994w

hand-held computer A portable computer small enough to be held and operated while holding it in one hand. (C) 610.10-1994w

handhole (1) An opening in an underground system containing cable, equipment, or both into which workmen reach but do not enter. (T&D) C2.2-1960

(2) An access opening, provided in equipment or in a below-the-surface enclosure in connection with underground lines, into which personnel reach but do not enter, for the purpose of installing, operating, or maintaining equipment or cable or both. (NESC) C2-1997

handler (1) A module or device that responds to a bus request (such as an interrupt request) as the slave to that request. (C/BA) 1014.1-1994w

(2) A program or routine that performs or controls one task (e.g., error detection). (SCC20) 1226-1998

handling device (of metal-clad switchgear) That accessory used for the removal, replacement, or transportation of the removable element. (SWG/PE) C37.100-1992

handling zone The portion of a disk or other storage medium that may be touched by the gripping mechanism or actuator. *Contrast:* recording area. (C) 610.10-1994w

hand/metal discharge *See:* hand/metal ESD.

hand/metal ESD An ESD from an intruding human hand that occurs from an intervening metal object such as a ring, tool, key, etc. *Synonym:* hand/metal discharge. (EMC/PE/SPD) C63.16-1993, C62.47-1992r

hand operation Actuation of an apparatus by hand without auxiliary power. *See also:* switch. (IA/ICTL/IAC) [60], [84]

hand-printed character font An international standard optical font for use on hand-generated documents. *See also:* OCR-B; OCR-A. (C) 610.2-1987

hand-print recognition Optical character recognition of hand-printed characters. (C) 610.2-1987

hand punch *See:* hand-feed punch.

hand receiver An earphone designed to be held to the ear by the hand. (EEC/PE) [119]

hand-reset relay A relay so constructed that it remains in the picked-up condition even after the input quantity is removed; specific manual action is required to reset the relay. *Synonym:* mechanically reset relay. (SWG/PE) C37.100-1992

handset (1) (transmission performance of telephone sets) An assembly that includes a handle and a telephone set transmitter and receiver. Other components such as the speech network may also be located in the handset. (COM/TA) 269-1983s

(2) An assembly intended to be held in the hand of the user that includes a transmitter and receiver. (For the purposes of this standard, a handset is a four-wire device, that is, it does not include a built-in speech network.) (COM/TA) 1206-1994

handset telephone *See:* hand telephone set.

handsfree reference point (HFRP) The calibration point on the reference axis of the mouth simulator, 50 cm in front of the lip plane. (COM/TA) 1329-1999

handsfree telephone (HFT) A device for connection to a telephone network capable of two-way voice communication without close coupling to the user's mouth or ear. (COM/TA) 1329-1999

handsfree telephone test circuit An assembly consisting of a handsfree telephone set(s) and interface(s) as may be required to realize simulated partial telephone connections. (COM/TA) 1329-1999

handshake (1) (FASTBUS acquisition and control) An interlocked exchange of signals between a master and a slave, controlling the transfer of data. (NID) 960-1993

(2) (test, measurement, and diagnostic equipment) A hardware or software sequence of events requiring mutual consent of conditions prior to change. (MIL) [2]

(3) (STEbus) An interlocked sequence of signals between interconnected boards in which each board waits for an acknowledgement of its previous signal before proceeding. (C/MM) 1000-1987r

handshake cycle (digital interface for programmable instrumentation) The process whereby digital signals effect the transfer of each data byte across the interface by means of an interlocked sequence of status and control signals. (An interlocked sequence is a fixed sequence of events in which one event in the sequence must occur before the next event may occur.) *See also:* interlocked sequence. (IM/AIN) 488.1-1987r

handshake status A status transfer which indicates the exchange of data between bus owner and replying agent(s). (C/MM) 1296-1987s

handshaking The exchange of predetermined signals or control measures between two systems or system components upon initial exchanges. *Note:* When the connection is established, the two components acknowledge each other. (C) 610.7-1995, 610.10-1994w

hand telephone set (telephone) A telephone set having a handset and a mounting that serves to support the handset when the latter is not in use. *Note:* The prefix desk, wall, drawer, etc., may be applied to the term hand telephone set to indicate the type of mounting. *See also:* telephone station. (PE/EEC) [119]

hand-to-metal impedance The impedance between the human hand and the metal object with which it is associated in a hand/metal ESD. The metal object is usually the intruder discharge electrode. Examples of hand-to-metal impedance include resistance and capacitance between the fingers and a key, between the wrist and a metal watch or bracelet, and between the hand and a screwdriver. (SPD/PE) C62.47-1992r

handwheel A wheel the rim of which serves as a handle for manual operation of a rotary device. (IA/ICTL/IAC) [60]

hand winding (rotating machinery) A winding placed in slots or around poles by a human operator. *See also:* rotor; stator. (PE) [9]

hang-off (accelerometer) (gyros) The displacement of an inertial sensing element from its null position that occurs when an input is applied and that is due to the finite compliance of a capture loop or a restoring spring. (AES/GYAC) 528-1994

hangover *See:* tailing.

hang-over time (T_H) Time from the input signal going below the threshold level until 3 dB of switched loss is inserted in the output signal. *Synonyms:* decay time; release time. (COM/TA) 1329-1999

hang-up hand telephone set (bracket-type handset telephone) (suspended-type handset telephone) A hand telephone set in which the mounting is arranged for attachment to a vertical surface and is provided with a switch bracket from which the handset is suspended. *See also:* telephone station. (PE/EEC) [119]

hang-up signal (telephone switching systems) A signal transmitted over a line or trunk to indicate that the calling party has released. (COM) 312-1977w

HA1 receiver weighting (data transmission) A noise weighting used in a noise measuring set to measure noise across the HA1 receiver of a of a subset with a number 302 receiver or a similar subset. The meter scale readings are in the dBa (HA1). (PE) 599-1985w

hard copy (1) (computer graphics) A printed copy of computer output in a readable form; for example, a printed report, a listing. *Contrast:* soft copy. (C) 610.2-1987, 610.6-1991w

(2) A paper record of information (e.g., reports, listings, logs, and charts). (SUB/PE) C37.1-1994

(3) A permanent record of information in readable form for human use, for example, reports, listings, displays, logs, and charts. (SWG/PE) C37.100-1992

hard cover *See:* conductor cover.

hard disk A magnetic disk that consists of a rigid platter. *Synonym:* fixed disk. *Contrast:* floppy disk. *See also:* Winchester disk. (C) 610.10-1994w

hardened computer A computer that is physically designed to function reliably in harsh environments such as extremes of temperature, shock and vibration, humidity or radiation. *Note:* Often required for space and military applications. *See also:* hostile environment computer. (C) 610.10-1994w

hard error (A) An error caused by a hardware failure or by accessing incompatible hardware. **(B)** A storage error in which the data that is retrieved is wrong and the storage cell will no longer hold the data written to it. *Contrast:* transient error; soft error. (C) 610.10-1994

hard failure (1) A failure that results in complete shutdown of a system. *Contrast:* soft failure. (C) 610.12-1990
(2) A cessation of some system or system component from which there is no possible recovery. (C) 610.10-1994w

hard limiting A type of limiting characterized by very little variation in the output within the range where the output is subject to limiting. *Contrast:* soft limiting. (C) 610.10-1994w

hard line (test, measurement, and diagnostic equipment) Any direct electrical connection between the unit under test and the testing device. (MIL) [2]

hard link (1) The relationship between two directory entries that represent the same file; the result of an execution of the `ln` utility or the POSIX.1 *link*() function. (C/PA) 9945-2-1993
(2) A directory entry. (C/PA) 1387.2-1995

hard macro A cluster whose cell placements relative to each other are fixed. Often the interconnect routing between the cells is also fixed and a parasitics file describing the interconnect is available for the hard macro. The location of the hard macro in the floorplan may or may not be fixed. (C/DA) 1481-1999

hard region A cluster that has defined physical boundaries in a floorplan. All cells contained in the cluster shall be placed within the boundaries of the cluster. (C/DA) 1481-1999

hard-sector Pertaining to a magnetic disk that is segmented by physical, non-alterable means such as a hole, known as an index hole, in the disk. *Contrast:* soft-sector. (C) 610.10-1994w

hardware (1) (software) Physical equipment used to process, store, or transmit computer programs or data. *Contrast:* software. (C) 610.12-1990, 610.10-1994w
(2) Physical equipment used in data processing, as opposed to programs, procedures, rules, and associated documentation. (C/PA) 14252-1996

hardware accelerator (A) A circuit which performs operations normally done in software much faster than they can be done in software. **(B)** A circuit that performs hardware operations much faster than the original hardware. For example: an 80386 based accelerator for an 80286 based machine. (C) 610.10-1994

hardware check *See:* automatic check.

hardware configuration item (HWCI) An aggregation of hardware that is designated for configuration management and treated as a single entity in the configuration management process. *Contrast:* computer software configuration item. *See also:* configuration item. (C) 610.12-1990

hardware description language (HDL) A general-purpose computer language designed to serve as an interface to the design, documentation, and validation of computer hardware. *Synonym:* computer hardware description language. *See also:* hardware design language. (C) 610.10-1994w

hardware design language (HDL) (1) A specification language with special constructs and, sometime, verification protocols, used to develop, analyze, and document a hardware design. *Contrast:* program design language. *See also:* design language; CINEMA. (C) 610.13-1993w, 610.12-1990
(2) A design language with special constructs and, sometimes verification protocols, used to develop, analyze, and document, a hardware design or computer architecture. *See also:* hardware description language. (C) 610.10-1994w

hardware failure A change in the characteristics of a system hardware element beyond its design tolerances. (VT/RT) 1483-2000

hardware item An aggregation of hardware that is designated for purposes of specification, testing, interfacing, configuration management, or other purposes. (C/SE) J-STD-016-1995

hardware language *See:* hardware description language; hardware design language; machine language.

hardware monitor (A) A device that measures or records specified events or characteristics of a computer system; for example, a device that counts the occurrences of various electrical events or measures the time between such events. *See also:* monitor; software monitor. **(B)** A software tool that records or analyzes hardware events during the execution of a computer program. *See also:* monitor; software monitor. (C) 610.12-1990

hardwire (test, measurement, and diagnostic equipment) Circuitry with the absence of electrical elements, such as resistors, inductors, capacitors: circuits containing only wire and terminal connections with no intervening switching inherent. (MIL) [2]

hardwired (1) (supervisory control, data acquisition, and automatic control) (station control and data acquisition) The implementation of processing steps within a device by way of the placement of conductors between components within the device. The processing steps are not alterable except by modifying the conducting paths between components. (SWG/PE/SUB) C37.1-1987s, C37.100-1992
(2) (hydroelectric power plants) Wired interconnections of relays and other control devices. (PE/EDPG) 1020-1988r
(3) Pertaining to a circuit or device whose characteristics are permanently determined by the interconnections between components. *Contrast:* programmable. (C) 610.10-1994w

hardwired logic A group of logic circuits permanently interconnected to perform a specific function. (C) 610.10-1994w

harmful interference Any emission, radiation, or induction that endangers the functioning, or seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service or any other equipment or system operating in accordance with regulations. *See also:* electromagnetic compatibility. (EMC) [53]

harmful quantity of oil A discharge of oil that violates applicable water quality standards, causes a film or sheen upon or discoloration of the surface of the water or adjoining shorelines, or causes a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines. (SUB/PE) 980-1994

harmonic (harmonic control and reactive compensation of static power converters) (converter characteristics) (self-commutated converters) A sinusoidal component of a periodic wave or quantity having a frequency that is an integral multiple of the fundamental frequency. *Note:* For example, a component, the frequency of which is twice the fundamental frequency, is called a second harmonic. *See also:* noncharacteristic harmonic; characteristic harmonic; relative harmonic content; harmonic components; harmonic content. (IA/SPD/PE/T&D/SPC) 936-1987w, C62.48-1995, 599-1985w, 519-1992, 1250-1995

harmonic analyzer A mechanical device for measuring the amplitude and phase of the various harmonic components of a periodic function from its graph. *See also:* wave analyzer; signal wave; instrument. (EEC/PE) [119]

harmonic, characteristic *See:* characteristic harmonic.

harmonic components (converter characteristics) (self-commutated converters) The components of the harmonic content as expressed in terms of the order and rms (root-mean-

square) values of the Fourier series terms describing the periodic function. (IA/SPC) 936-1987w

harmonic conjugate *See:* Hilbert transform.

harmonic content (1) (converter characteristics) (self-commutated converters) The function obtained by subtracting the dc (direct current) and fundamental components from a nonsinusoidal periodic function. (IA/SPC) 936-1987w

(2) (nonsinusoidal periodic wave) The deviation from the sinusoidal form, expressed in terms of the order and magnitude of the Fourier series terms describing the wave. *See also:* rectification; power rectifier. (IA/SPC) [62]

(3) Distortion of a sinusoidal waveform characterized by indication of the magnitude and order of the Fourier series terms describing the wave. *Note:* For power lines, the harmonic content is small and of little concern for the purpose of field measurements, except at points near large industrial loads (saturated power transformers, rectifiers, aluminum and chlorine plants, etc.) where certain harmonics may reach 10% of the line voltage. Laboratory installations also may have voltage or current sources with significant harmonic content. (T&D/PE) 644-1994, 539-1990

(4) A measure of the presence of harmonics in a voltage or current wave form expressed as a percentage of the amplitude of the fundamental frequency at each harmonic frequency. The total harmonic content is expressed as the square root of the sum of the squares of each of the harmonic amplitudes (expressed as a percentage of the fundamental). (IA/PSE) 446-1995

harmonic conversion transducer (frequency multiplier, frequency divider) A conversion transducer in which the output-signal frequency is a multiple or submultiple of the input frequency. *Notes:* 1. In general, the output-signal amplitude is a nonlinear function of the input-signal amplitude. 2. Either a frequency multiplier or a frequency divider is a special case of harmonic conversion transducer. *See also:* transducer; heterodyne conversion transducer. (ED) 161-1971w

harmonic distortion (1) (data transmission) Nonlinear distortion of a system or transducer characterized by the appearance in the output of harmonics other than the fundamental component when the input wave is sinusoidal. *Note:* Subharmonic distortion may also occur. (PE) 599-1985w

(2) (broadband local area networks) A form of interference caused by the generation of signals according to the relationship N_f, where N is an integer greater than one and f is the original signal's frequency. (LM/C) 802.7-1989r

(3) For a pure sine wave input, output components at frequencies that are an integer multiple of the applied sine wave frequency. (IM/WM&A) 1057-1994w

(4) Nonlinear distortion that appears as harmonics of a single-frequency input. (PE/IC) 1143-1994r

(5) The mathematical representation of the distortion of the pure sine waveform. *See also:* distortion factor. (IA/PSE) 1100-1999

harmonic factor The ratio of the root-sum-square (rss) value of all the harmonics to the root-mean-square (rms) value of the fundamental.

$$\text{harmonic factor (for voltage)} = \frac{\sqrt{E_3^2 + E_5^2 + E_7^2 \ldots}}{E_1}$$

$$\text{harmonic factor (for current)} = \frac{\sqrt{I_3^2 + I_5^2 + I_7^2 \ldots}}{I_1}$$

(IA/SPC) 519-1992

harmonic leakage power (TR and pre-TR tubes) The total radio-frequency power transmitted through the fired tube in its mount at frequencies other than the fundamental frequencies generated by the transmitter. (ED) 161-1971w

harmonic, noncharacteristic *See:* noncharacteristic harmonic.

harmonic-restraint relay A restraint relay so constructed that its operation is restrained by harmonic components of one or more separate input quantities. (SWG/PE) C37.100-1992

harmonics *See:* harmonic components.

harmonic series A series in which each component has a frequency that is an integral multiple of a fundamental frequency. (SP) [32]

harmonic telephone ringer A telephone ringer that responds only to alternating current within a very narrow frequency band. *Note:* A number of such ringers, each responding to a different frequency, are used in one type of selective ringing. *See also:* telephone station. (EEC/PE) [119]

harmonic test (rotating machinery) A test to determine directly the value of one or more harmonics of the waveform of a quantity associated with a machine, relative to the fundamental of that quantity. *See also:* asynchronous machine. (PE) [9]

harmonization The process of ensuring that profiles do not overlap or conflict. (C/PA) 14252-1996

harness A component with a design of straps that is fastened about the worker in a manner so as to contain the torso and distribute the fall arrest forces over at least the upper thighs, pelvis, chest, and shoulders with means for attaching it to other components and subsystems. (NESC/T&D/PE) C2-1997, 1307-1996

harsh environment (nuclear power generating station) An environment expected as a result of the postulated service conditions appropriate for the design basis and post-design basis accidents of the station. (A design basis accident is that subset of a design basis event which requires safety function performance). Harsh environments are the result of a loss of cooling accident (LOCA)/high energy line break (HELB) inside containment and post-LOCA or HELB outside containment. (PE/NP) 323-1974s

hartley A unit of information content, equal to one decadal decision, or the designation of one of ten possible and equally likely values or states of anything used to store or convey information. *Notes:* 1. A hartley may be conveyed by one decadal code element. One hartley equals (log of 10 to base 2) times one bits. 2. If, in the definition of information content, the logarithm is taken to the base ten, the result will be expressed in hartleys. *Synonym:* dit. *See also:* bit. (IT/PE) [123], 599-1985w

Hartley oscillator An electron tube or solid state circuit in which the parallel-tuned tank circuit is connected between grid and plate, the inductive element of the tank having an intermediate tap at cathode potential, and the necessary feedback voltage obtained across the grid-cathode portion of the inductor. *See also:* radio-frequency generator. (IA) 54-1955w

Harvard class architecture A computer architecture with separate paths to main storage for instructions and data, allowing for a high memory bandwidth. *Contrast:* Von Neumann architecture. (C) 610.10-1994w

hash To calculate the hash value for a given item. *See also:* hashing. (C) 610.5-1990w

hash address *See:* hash value.

hash addressing *See:* hashing.

hash clash *See:* collision.

hash coding *See:* hashing.

hash function In hashing, the function used to determine the position of a given item in a set of items. *Note:* The function operates on a selected field, called a key, in each item and the function is generally a many-to-one mapping. *Synonyms:* key transformation function; calc algorithm. *See also:* key folding function; division transformation function; algebraic coding function; key transformation; mid-square function; radix transformation function; multiplication transformation function; digit transformation function. (C) 610.5-1990w

hash index *See:* hash value.

hashing A technique for arranging a set of items, in which a hash function is applied to the key of each item to determine its hash value. The hash value identifies each item's primary position in a hash table, and if this position is already occupied, the item is inserted either in an overflow table or in another available position in the table. *Synonyms:* scatter stor-

age; hash coding; randomizing. *See also:* open-address hashing; separate chaining; hash addressing; collision resolution. (C) 610.5-1990w

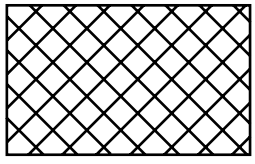
hash search The use of a hash function and collision resolution to locate an item in a hash table. (C) 610.5-1990w

hash table A two-dimensional table of items in which a hash function is applied to the key of each item to determine its hash value. The hash value identifies each item's primary position in the table, and if this position is already occupied, the item is inserted either in an overflow table or in another available position in the table. (C) 610.5-1990w

hash total The result of summing two or more values of a set for purposes of validation or error detection. *Synonym:* control total. (C) 610.5-1990w

hash value The number generated by a hash function to indicate the position of a given item in a hash table. *Synonyms:* hash index; hash address. (C) 610.5-1990w

hatch A series of one or more sets of evenly spaced parallel lines within a closed boundary on a display surface. *See also:* crosshatch.



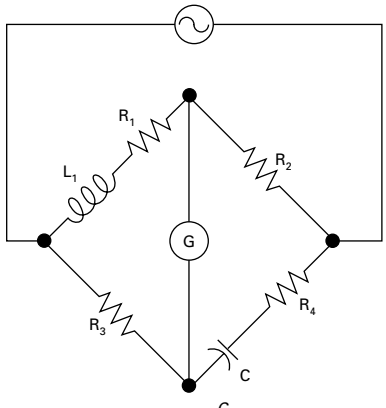
hatch

(C) 610.6-1991w

HATS *See:* head and torso simulator.

hauptnutzzeit *See:* utilization time.

Hay bridge A 4-arm alternating-current bridge in which the arms adjacent to the unknown impedance are nonreactive resistors and the opposite arm comprises a capacitor in series with a resistor. *Note:* Normally used for the measurement of inductance in terms of capacitance, resistance, and frequency. Usually, the bridge is balanced by adjustment of the resistor that is in series with the capacitor, and of one of the nonreactive arms. The balance depends upon the frequency. It differs from the Maxwell bridge in that in the arm opposite the inductor, the capacitor is in series with the resistor. *See also:* bridge.



$$L_1 = R_2 R_3 \frac{C}{1 + \omega^2 C^2 R_4^2}$$

$$R_1 = R_2 R_3 \frac{\omega^2 C^2 R_4}{(1 + \omega^2 C^2 R_4^2)}$$

Hay bridge

(EEC/PE) [119]

hazard (1) (nuclear power generating station) A specified result of a design basis event that could cause unacceptable damage to systems or components important to safety. (PE/NP) 384-1981s

(2) (overhead power lines) A threat to the health, survival, or reproduction of an organism from some natural or artificial agent or event. (T&D/PE) 539-1990

(3) An intrinsic property or condition that has the potential to cause harm or damage. (DEI) 1221-1993w

(4) An existing or potential condition that can result in a mishap. (VT/RT) 1473-1999, 1483-2000

hazard analysis A systematic qualitative or quantitative evaluation of software for undesirable outcomes resulting from the development or operation of a system. These outcomes may include injury, illness, death, mission failure, economic loss, property loss, environmental loss, or adverse social impact. This evaluation may include screening or analysis methods to categorize, eliminate, reduce, or mitigate hazards. (C/SE) 1012-1998

hazard beacon (illuminating engineering) An aeronautical beacon used to designate a danger to air navigation. *Synonym:* obstruction beacon. (EEC/IE) [126]

hazard buoy *See:* danger buoy.

hazard current (1) (health care facilities) For a given set of connections in an isolated power system, the total current that would flow through a low impedance if it were connected between either isolated conductor and ground. The various hazard currents are: fault hazard current; monitor hazard current; total hazard current. *See also:* total hazard current; monitor hazard current; fault hazard current. (EMB) [47]

(2) (health care facilities) For a given set of connections in an isolated system, the total current that would flow through a low impedance if it were connected between either isolated conductor and ground. Fault Hazard Current: The hazard current of a given isolated system with all devices connected except the line isolation monitor. Monitor Hazard Current: The hazard current of the line isolation monitor alone. Total Hazard Current: The hazard current of a given isolated system with all devices, including the line isolation monitor, connected. (NESC/NEC) [86]

hazard-free logic A group of logic circuits that are not subject to failures due to logic failure conditions. (C) 610.10-1994w

hazardous (classified) locations Class I Locations. Class I locations are those in which flammable gases or vapors are or may be present in the air in quantities sufficient to produce explosive or ignitible mixtures. Class I locations shall include those specified in (a) and (b) below.

a) Class I, Division 1. A Class I, Division 1 location is a location:
   1) in which hazardous concentrations of flammable gases or vapors exist continuously intermittently, or periodically under normal operating conditions; or
   2) in which hazardous concentrations of such gases or vapors may exist frequently because of repair or maintenance operations or because of leakage; or
   3) in which breakdown or faulty operations of equipment or processes might release hazardous concentrations of flammable gases or vapors, and might also cause simultaneous failure of electric equipment. This classification usually includes locations where volatile flammable liquids or liquefied flammable gases are transferred from one container to another; interiors of spray booths and areas in the vicinity of spraying and painting operations where volatile flammable solvents are used; locations containing open tanks or vats of volatile flammable liquids; drying rooms or compartments for the evaporation of flammable solvents; portions of cleaning and dyeing plants where hazardous liquids are used; gas generator rooms and other portions of gas manufacturing plants where flammable gas may escape; inadequately ventilated pump rooms for flammable gas or for volatile flammable liquids; the interiors of refrigerators and freezers in which volatile flammable materials are stored in open, lightly stoppered, or easily ruptured containers; and all other locations where hazardous concentrations of flammable vapors or gases are likely to occur in the course of normal operations.

b) Class I, Division 2. A Class I, Division 3 location is a location
1) in which volatile flammable liquids or flammable gases are handled, processed, or used, but in which the hazardous liquids, vapors, or gases will normally be confined within closed containers or closed systems from which they can escape only in case of accidental rupture or breakdown of such containers or systems, or in case of abnormal operation of equipment; or
2) in which hazardous concentrations of gases or vapors are normally prevented by positive mechanical ventilation, and which might become hazardous though failure or abnormal operation of the ventilating equipment; or
3) that is adjacent to a Class I, Division I location, and to which hazardous concentrations of gases or vapors might occasionally be communicated unless such communication is prevented by adequate positive-pressure ventilation from a source of clean air, and effective safeguards against ventilation failure are provided. This classification usually includes locations where volatile flammable liquids or flammable gases or vapors are used, but which, in the judgment of the authority having jurisdiction, would become hazardous only in case of an accident or of some unusual operating condition, The quantity of hazardous material that might escape in case of accident, the adequacy of ventilating equipment, the total area involved, and the record of the industry or business with respect to explosions or fires are all factors that merit consideration in determining the classification and extent of each location. Piping without valves, checks, meters and similar devices would not ordinarily introduce a hazardous condition even even though used for hazardous liquids or gases. Locations used for the storage of hazardous liquids or of compressed gases in sealed containers would not normally be considered hazardous unless subject to other hazardous conditions also. Electrical conduits and their associated enclosures separated from process fluids by a single seal or barrier shall include those specified in (a) and (b) below.

c) Class II, Division 1. A Class II, Division I location is a location
1) in which combustible dust is or may be in suspension in the air continuously, intermittently, or periodically under normal operating conditions, in quantities sufficient to produce explosive or ignitible mixtures; or
2) where mechanical failure or abnormal operation of machinery or equipment might cause such explosive or ignitible mixtures to be produced and might also provide a source of ignition through simultaneous failure of electric equipment, operation of protection devices or from other causes; or
3) in which combustible dusts of an electrically conductive nature may be present. This classification usually includes the working areas of grain handling and storage plants; rooms containing grinders or pulverizers, cleaners, graders, scalpers, open conveyors or spouts, open bins or hoppers, mixers or blenders, automatic hopper scales, packing machinery, elevator heads and boots, stock distributors, dust and stock collectors (except all-metal collectors vented to the outside), and all similar dust-producing machinery and equipment in grain-processing plants, starch plants, sugar-pulverizing plants, malting plants, hay-grinding plants, and other occupancies of similar nature; coal-pulverizing plants (except where the pulverizing equipment is essentially dust-tight); all working areas where metal dusts and powders are produced, processed, handled, packed, or stored (except in tight containers); and all other similar locations where combustible dust may, under normal operating conditions be present in the air in quantities sufficient to produce explosive or ignitible mixtures. Combustible dusts which are electrically nonconductive include dusts produced in the handling and processing of grain and grain products, pulverized sugar and cocoa, dried egg and milk powders, pulverized spices, starch and pastes, potato and woodflour, oil meal from beans and seed, dried hay, and other oganic materials which may produce combustible dusts when processed or handled. Electrically conductive nonmetallic dusts include dusts from pulverized coal, coke, carbon black, and charcoal. Dusts containing magnesium or aluminum are particularly hazardous and the use of extreme precaution will be necessary to avoid ignition and explosion.

d) Class II, Division 2. A Class II, Division 2 location is a location in which combustible dust will not normally be in suspension in the air or will not be likely to be thrown into suspension by the normal operation of equipment or apparatus in quantities sufficient to produce explosive or ignitible mixtures, but;
1) where deposits or accumulations of such combustible dust may be sufficient to interfere with the safe dissipation of heat from electric equipment or apparatus; or
2) where such deposits or accumulations of combustible dust on, in, or in the vicinity of electric equipment might be ignited by arcs, sparks, or burning material from such equipment. Locations where dangerous concentrations of suspended dust would not be likely but where dust accumulations might form on, or in the vicinity of electric equipment, would include rooms and areas containing only closed spouting and conveyors, closed bins or hoppers, or machines and equipment from which appreciable quantities of dust would escape only under abnormal operating conditions; rooms or areas adjacent to a Class II, Division 1 location as described in (a) above.

(NESC) [86]

hazardous area class I The locations in which flammable gases or vapors are or may be present in the air in quantities sufficient to produce explosive or ignitible mixtures. *See also:* explosion-proof apparatus. (NESC) [86]

hazardous electrical condition (electrolytic cell line working zone) Exposure of personnel to surfaces, contact with which may result in the flow of injurious electrical current. (IA/PC) 463-1993w

hazardous levels of nonionizing electromagnetic radiation (radio frequency radiation hazard warning symbol) Incident electromagnetic energy that may be biologically detrimental or may directly or indirectly cause ignition of explosive materials or vapors. (NIR) C95.2-1982r

hazardous levels of radio-frequency energy Term used to describe incident RF energy that may be biologically detrimental or may directly or indirectly cause ignition of explosive materials or vapors. (NIR/SCC28) C95.2-1999

hazardous location (illuminating engineering) An area where ignitable vapors or dust may cause a fire or explosion created by energy emitted from lighting or other electrical equipment or by electrostatic generation. (EEC/IE) [126]

hazardous material (1) Any material that has been so designated by governmental agencies or adversely impacts human health or the environment. (PE/SUB) 1127-1998 **(2)** Those vapors, dusts, fibers or flyings which are explosive under certain conditions. (SWG/PE) C37.100-1981s

hazardous substance (liquid-filled power transformers) A quantity of material offered for transportation in one package or transport vehicle, when the material is not packaged that equals or exceeds the reportable quantity (RQ) specified for the material in Code of Federal Regulations (CFR), Title 40, Parts 116 and 117. (LM/C) 802.2-1985s

haze *See:* fog.

H beacon (electronic navigation) A designation applied to two types of facilities: A) A nondirectional radio beacon for homing by means of an airborne direction finder. B) A radar air navigation system using an airborne interrogator to measure the distances from two ground transponders. *See also:* navigation. (AES/RS) 686-1982s, [42]

H channel A wideband channel (i.e., a channel that contains multiples of 64 kbit/s).
(C/COM/LM) 8802-9-1996, 802.9a-1995w

HCI *See:* human/computer interface.

HCL *See:* relay, high, common, low.

HCP Horizontal coupling plane. *See also:* coupling plane.
(EMC) C63.16-1993

HC threshold voltage *See:* high conduction threshold voltage.

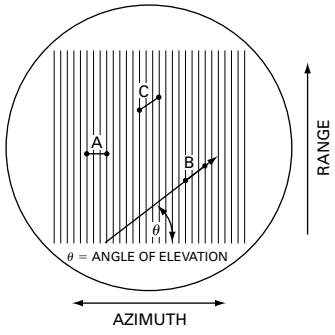
HDA *See:* head/disk assembly.

HDAM *See:* hierarchical direct access method.

HDBH *See:* high day busy-hour load.

HDBH load *See:* high day busy-hour load; time-consistent traffic measures.

H-display (1) (navigation aid terms) A type of radar display format. (AES/GCS) 172-1983w
(2) A B-display modified to include an indication of angle of elevation. The target appears as two closely spaced blips approximating a short bright line, the slope of which is in proportion to the tangent of the angle of target elevation.



H-display

(AES) 686-1997, [42]

HDL *See:* hardware description language; hardware design language.

HDLC *See:* high-level data link control.

head (1) A device that reads, records, or erases data on a storage medium. *Note:* For example, a small electromagnet used to read, write, or erase data on a magnetic drum or tape, or the set of perforating, reading, or marking devices used for punching, reading, or printing on paper tape.
(C) [20], [85]
(2) (hydroelectric power plants) The difference in hydraulic energy between two points, which includes the elevation head, pressure head, and velocity head.
(PE/EDPG) 1020-1988r
(3) (data management) The first data item in a list. *Synonym:* header. (C) 610.5-1990w
(4) (A) A device that reads, writes, or erases data on a storage medium. For example, a small electromagnet (magnetic head) used to read, write, or erase data on a magnetic drum or magnetic tape, or a device such as a laser that reads and writes data on an optical storage medium. *See also:* write head; read/write head; read head; magnetic head. **(B)** A device within an output device, such as a printer or display device, that controls the creation of images on the device. *See also:* scan head; plotting head; display head; print head. (C) 610.10-1994
(5) *See also:* head water benefits; gross head; rated head; critical head; net head.

head and torso simulator (HATS) A device that accurately reproduces the sound transmission and pick-up characteristics of the median head and torso of adult humans.
(COM/TA) 1206-1994, 1329-1999

head crash The sudden and complete failure of a disk drive caused by a physical collision between the read/write head and the surface of the recording medium. *Note:* Usually results in destruction of the head and part or all of the data on the medium. *See also:* disk crash. (C) 610.10-1994w

head/disk assembly In a magnetic disk device, an assembly that includes the magnetic disk, magnetic head, and an access mechanism. (C) 610.10-1994w

headed brush (rotating machinery) A brush having a top (cylindrical, conical, or rectangular) with a smaller cross section than the cross section of the body of the brush. *Note:* The length of the head shall not exceed 25 percent of the overall length. *See also:* brush. (EEC/LB) [101]

headend (1) (A) (broadband local area networks) The central location that has access to signals traveling in both inbound and outbound directions. The logical root of the broadband coaxial cable system. **(B) (broadband local area networks)** The physical location where the inbound and outbound paths are accessible. The headend is also called the central retransmission facility. (LM/C) 802.7-1989
(2) A point where two or more half-duplex data paths are joined on the communications network. (C) 610.7-1995
(3) In 10BROAD36, the location in a broadband system that serves as the root for the branching tree comprising the physical medium; the point to which all inbound signals converge and the point from which all outbound signals emanate.
(C/LM) 802.3-1998

headend port (broadband local area networks) (or ports) An interface where connection(s) may be made to insert signals or remove signals from the cable plant. The headend ports are usually referred to with a direction (inbound or outbound). Headend ports provide central access to the cable system.
(LM/C) 802.7-1989r

head-end system (railways) A system in which the electrical requirements of a train are supplied from a generator or generators, located on the locomotive or in one of the cars, customarily at the forward part of the train. *Note:* The generators may be driven by steam turbine, internal-combustion engine, or, if located in one of the cars, by a mechanical drive from a car axle. *See also:* axle-generator system.
(EEC/PE) [119]

header (1) A transverse raceway for electric conductors, providing access to predetermined cells of a cellular metal floor, thereby permitting the intallation of electric conductors from a distribution center to the cells. (NESC/NEC) [86]
(2) (A) (software) A block of comments placed at the beginning of a computer program or routine. **(B) (software)** Identification or control information placed at the beginning of a file or message. *Contrast:* trailer. (C) 610.12-1990
(3) (A) (data management) Pertaining to data that describes and pertains to other data. For example, the header record for a file might describe the format for the remaining records in the file. **(B) (data management)** *See also:* head.
(C) 610.5-1990
(4) *See also:* running header. (C) 610.2-1987
(5) A structure attached to or integral to the top of the heatsink used for structural performance and marking.
(C/BA) 1101.3-1993
(6) The contiguous control bits preceding a frame, packet, block, or other data stream of bits that contain information about the message such as the address, type of frame, and/or sequencing. *Contrast:* trailer. (C) 610.7-1995

header card A punch card that contains information identifying data in the cards that follow. *Contrast:* trailer card.
(C) 610.10-1994w

header hub (HH) The highest-level hub in a hierarchy of hubs. The HH broadcasts signals transmitted to it by lower level hubs or DTEs such that they can be received by all DTEs that may be connected to it either directly or through intermediate hubs. (LM/C) 802.3-1998, 610.7-1995

header label An internal label, immediately preceding the first record of a file, that identifies the file and contains data used in file control. (C) 610.5-1990w

HEADER packet A packet originating in the MTM-Bus Master that is the first packet of an MTM-Bus message. The HEADER packet includes an address and a command field. The address identifies which S-module(s) are to interpret and

act upon the command contained within the command field. (TT/C) 1149.5-1995

head gap (1) (test, measurement, and diagnostic equipment) The space or gap intentionally inserted into the magnetic circuit of the head in order to force or direct the recording flux into or from the recording medium. (MIL) [2]
(2) The distance between a read/write head and the surface of a recording medium. (C) 610.10-1994w

heading (navigation) The horizontal direction in which a vehicle is pointed, expressed as an angle between a reference line and the line extending in the direction the vehicle is pointed, usually measured clockwise from the reference line. *See also:* navigation. (AES/RS) 686-1982s, [42]

heading-effect error (navigation) A manifestation of polarization error causing an error in indicated bearing that is dependent upon the heading of a vehicle with respect to the direction of signal propagation. *Note:* Heading-effect error is a special case of attitude-effect error where the vehicle is in a straight level flight: it is sometimes referred to as course push (or pull). *See also:* navigation. (AES/RS) 686-1982s, [42]

headlamp (illuminating engineering) A major lighting device mounted on a vehicle and used to provide illumination ahead of it. *Synonym:* headlight. (EEC/IE) [126]

headlight *See:* headlamp.

head loading zone The relative distance that a read/write head travels with respect to a rotating storage device in order to achieve the proper clearance between the head and the surface of the medium. (C) 610.10-1994w

headloss (hydroelectric power plants) Loss of potential energy mainly due to hydraulic friction. This loss is usually expressed in feet or meters of head. (PE/EDPG) 1020-1988r

head of bus function The function that generates *empty Queued Arbitrated (QA) slots, Pre-Arbitrated (PA) slots,* and *management information octets* at the point on each bus where data flow starts. The Head of Bus function also inserts the *virtual channel identifier* in the *PA segment header* of PA slots. (LM/C) 8802-6-1994

head or butt cable *See:* hand (head or butt) cable (mining).

head-per-track disk drive A disk drive in which one fixed head is located over each track on the drive. (C) 610.10-1994w

head positioner A component within a storage device that positions a floating head over a specific track on the storage medium. (C) 610.10-1994w

headquarters system (direct-connected system) A local system to which has been added means of transmitting system signals to and receiving them at an agency maintained by the local government, for example, in a police precinct house, or fire station. *See also:* protective signaling. (PE/EEC) [119]

head receiver An earphone designed to be held to the ear by a headband. *Note:* One or a pair (one for each ear) of head receivers with associated headband and connecting cord is known as a headset. (EEC/PE) [119]

headset An assembly, including a transmitter and receiver, intended to be worn on the head of the user. (COM/TA) 1206-1994

head space (test, measurement, and diagnostic equipment) The space between the reading or recording head and the recording medium, such as tape, drum or disc. (MIL) [2]

head switching (A) The use of two read/write heads, one to read from the medium and one to write on another medium. **(B)** The process of switching from one head to another, either on the same or on different storage media. (C) 610.10-1994

headwater (hydroelectric power plants) Source of energy for a hydraulic turbine. (PE/EDPG) 1020-1988r

head water benefits (power operations) The benefits brought about by the storage or release of water by a reservoir project upstream. Application of the term is usually in reference to benefits to a downstream hydroelectric power plant. (PE/PSE) 858-1987s

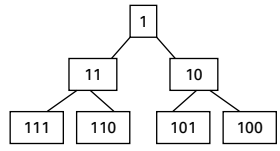
headway The time interval between the passing of the front ends of successive vehicles or trains moving along the same lane or track in the same direction. (VT/RT) 1474.1-1999

health Summary information regarding the current ability of a system or subsystem to perform its intended function. (VT) 1482.1-1999

health care facilities (health care facilities) Buildings, portions of buildings, and mobile facilities, that contain but are not necessarily limited solely to premises designed for use as hospitals, nursing homes, residential custodial care facilities, clinics, or medical and dental offices. (NESC/NEC) [86]

health information system (HIS) *See:* hospital information system.

heap (data management) A complete binary tree in which the key for each child node contains the key from its parent plus some additional value.



heap

(C) 610.5-1990w

heapsort A tree selection sort in which the items to be sorted are used to build a heap, and the items are then selected from the heap in the sorted order. (C) 610.5-1990w

hearing loss (1) (for speech) The difference in decibels between the speech levels at which the average normal ear and the defective ear, respectively, reach the same intelligibility, often arbitrarily set at 50 %.
(2) (hearing-threshold level) (ear at a specified frequency) The amount, in decibels, by which the threshold of audibility for that ear exceeds a standard audiometric threshold. *Notes:* 1. *See:*American Standard Specification for Audiometers for General Diagnostic Purposes. 2. This concept was at one time called deafness: such usage is now deprecated. 3. Hearing loss and deafness are both legitimate qualitative terms for the medical condition of a moderate or severe impairment of hearing, respectively. Hearing level, however, should only be used to designate a quantitative measure of the deviation of the hearing threshold from a prescribed standard. (SP) [32]

heartbeat A signal or a message passed between cooperating processes to indicate continuing proper operations. *See also:* signal quality error heartbeat. (C) 610.7-1995

heat capacity (1) The amount of heat necessary to raise the temperature of a given mass of a substance 1°—the mass multiplied by the specific heat. (IA/PSE) 241-1990r
(2) *(A) homogeneous conductors:* The specific heat of the conductor's material times the mass per unit length. *(B) nonhomogeneous conductors:* The sum of the heat capacities of the conductor's component materials. (T&D/PE) 738-1993
(3) The heat required to raise the temperature of a unit mass of material by one degree. (DEI) 1221-1993w

heat detector (1) (burglar-alarm system) A temperature-sensitive device mounted on the inside surface of a vault to initiate an alarm in the event of an attack by heat or burning. *See also:* protective signaling. (PE/EEC) [119]
(2) (fire alarm system) A device that detects abnormally high temperature or rate-of-temperature rise to initiate a fire alarm. (NFPA) [16]

heater (1) (electric pipe heating systems) A length of resistance material connected between terminals and used to generate heat electrically. Heaters, as used in this application, can take the form of cables with various sheath materials, blankets, and pads. *Synonym:* heating element. (PE/EDPG) 622-1979s
(2) (electron tube) An electric heating element for supplying heat to an indirectly heated cathode. *See also:* electrode. (ED) 161-1971w

heater coil *See:* load, work, or heater coil.

heater connector (heater plug) A cord connector designed to engage the male terminal pins of a heating or cooking appliance. (PE/EEC) [119]

heater current The current flowing through a heater. *See also:* filament current; electronic controller; preheating time cathode. (ED) [45]

heater de-energized maximum intermittent exposure temperature The maximum temperature of any surface adjacent to the heating device that the de-energized heating device can withstand for specified periods. (IA) 515-1997

heater energized maximum intermittent exposure temperature The maximum temperature of any surface adjacent to the heating device that the energized heating device can withstand for specified periods. (IA) 515-1997

heater transformer Supplies power for electron-tube filaments or heaters of indirectly heated cathodes. *See also:* electronic controller. (IA/ICTL/IAC) [60]

heater voltage The voltage between the terminals of a heater. *See also:* electronic controller; electrode voltage. (ED) [45]

heater warm-up time *See:* cathode heating time.

heat exchanger *See:* cooler.

heat-exchanger cooling system (1) (rectifier) A cooling system in which the coolant, after passing over the cooling surfaces of the rectifier, is cooled in a heat exchanger and recirculated. *Note:* The coolant is generally water of a suitable purity, or water that has been treated by a corrosion-inhibitive chemical. Antifreeze solutions may also be used where there is exposure to low temperatures. The heat exchanger is usually either:

1) Water-to-water where the heat is removed by raw water,
2) Water to-air where the heat is removed by air supplied by a blower,
3) Air-to-water,
4) Air-to-air,
5) Refrigeration cycle. The liquid in the closed system may be other than water, and the gas in the closed system may be other than air.

See also: rectifier; rectification. (IA) [62]

(2) (thyristor controller) A cooling system in which the coolant, after passing over the cooling surfaces of the thyristor controller components, is cooled in a heat exchanger and recirculated. *Note:* Heat may be removed from the thyristor controller component's cooling surfaces by liquid or air using the following types of heat exchangers:

a) Water-to-water,
b) Water-to-air,
c) Air-to-water,
d) Air-to-air,
e) Refrigeration cycle. The liquid in the closed system may be other than water, and the gas in the closed system may be other than air.

(IA/IPC) 428-1981w

heat flux The flow of heat per unit area; i.e., thermal energy incident upon a surface area per unit time [kW/m^2 (kJ/m^2/s)]. (DEI) 1221-1993w

heating cycle One complete operation of the thermostat from ON to ON or from OFF to OFF. (IA/APP) [90]

heating device Heating cable or surface heating unit. (IA) 515-1997

heating element A length of resistance material connected between terminals and used to generate heat electrically. *See also:* appliance outlet. (IA/APP) [90]

heating, glue line *See:* glue-line heating.

heating pattern The distribution of temperature in a load or charge. *See also:* induction heating. (IA) 54-1955w, 169-1955w

heating station (dielectric heating) The assembly of components, which includes the work coil or applicator and its associated production equipment. (IA) 54-1955w

heating system, radiant *See:* radiant heating system.

heating time, tube *See:* preheating time.

heating unit (1) (electrical appliances) An assembly containing one or more heating elements, electric terminals or leads, electrical insulation, and a frame, casing, or other suitable supporting means. *See also:* appliance outlet; appliance. (IA/APP) [90]

(2) A structure containing one or more heating elements, electrical terminals or leads, electric insulation and a frame or casing, all of which are assembled into one unit. (IA/PSE) 241-1990r

heating-up run (rotating electric machinery) A period of operation with current and ventilation designed to bring the machine to approximately its temperature-rise limit. (PE/EM) 11-1980r

heating ventilation and air conditioning (HVAC) system pull down The condition wherein the air conditioning system in the car is turned on and is required to cool a car that has been sitting in the heat of the day. *Note:* This condition usually presents the highest/longest sustained power demands on the auxiliary inverter. (VT) 1476-2000

heat loss (1) (electrical heating systems) A quantitative value of energy flow from a pipe, a vessel, or equipment to the surrounding ambient. (BT/IA/AV/PC) 152-1953s, 844-1991, 515-1997

(2) (waveguide terms) The part of the transmission loss due to the conversion of electric energy into heat. (MTT) 146-1980w

(3) A quantitative value of the rate of thermal energy flow from a pipe, vessel, or equipment to the surrounding ambient. (IA/PC) 515.1-1995

heat of combustion The thermal energy (chemical, convective, and radiative) per unit mass, i.e., MJ/kg (BTU/lb), released during burning. (DEI) 1221-1993w

heat of gasification The heat required to convert a unit mass of material to a vapor. (DEI) 1221-1993w

heat pump (electric power systems in commercial buildings) A refrigerating system employed to transfer heat into a space or substance. The condenser provides the heat, while the evaporator is arranged to pick up heat from the air, water, etc. By shifting the flow of air or other fluid, a heat pump system may also be used to cool a space. (IA/PSE) 241-1990r

heat rate (generating station) A measure of generating station thermal efficiency, generally expressed as BTU per kilowatt hour. *Note:* It is computed by dividing the total BTU content of the fuel burned (or of heat released from a nuclear reactor) by the resulting kilowatt hours generated. (PE/PSE) 346-1973w

heat rejection rate (nuclear power generating station) The rate at which a module emits heat energy to its environment (watts/hr or btu). (PE/NP) 381-1977w

heat release rate The rate of energy release associated with the combustion of a material, i.e., kW/m^2(kJ/m^2/s). (DEI) 1221-1993w

heat-run test A test that verifies equipment to be within thermal design when operated for an extended period at maximum current. *Synonym:* loading test. (PE/SUB) 1378-1997

heat-shield (cathode) (electron tube) A metallic surface surrounding a hot cathode, in order to reduce the radiation losses. *See also:* electron tube. (ED) [45], [84]

heat shrink A joint that consists of a tube or a series of tubes that are applied over the conductor and reduced in diameter over the cable with the use of externally applied heat. (PE/IC) 404-1993

heat sink (1) (electrical heat tracing for industrial applications) A part that conducts and dissipates heat away from the pipeline or vessel (the pipe or equipment). Heat sinks, as related to pipe heating systems, can be pipe supports, valve operators, etc. (BT/IA/AV/PC) 152-1953s, 844-1991

(2) (electric pipe heating systems) A part that absorbs heat. Heat sinks, as related to electric pipe heating systems, are those masses of materials that are directly connected to mechanical piping, valves, tanks, etc. that can absorb the heat generated by heaters, thus reducing the effect of the heater. Typical heat sinks can be pipe hangers, valve operators, etc. (PE/EDPG) 622-1979s

(3) (semiconductor rectifier diode) A mass of metal generally having much greater thermal capacity than the diode itself and intimately associated with it. It encompasses that part of the cooling system to which heat flows from the diode by thermal conduction only and from which heat may be removed by the cooling medium. (IA) [62]

(4) (photovoltaic power system) A material capable of absorbing heat: a device utilizing such material for the thermal protection of components or systems. (AES) [41]

(5) A part, also referred to as a frame, that serves both as a structural support and the principal thermal conduction medium. The PWB is attached to the heat sink. The heat sink spreads and conducts the heat from the components to the guide ribs (for conduction-cooled modules only). (C/BA) 1101.3-1993

(6) A part that conducts and dissipates heat away from the pipe or equipment. Heat sinks, as related to pipe heating systems, can be pipe supports, valve operators, etc. (IA) 515-1997

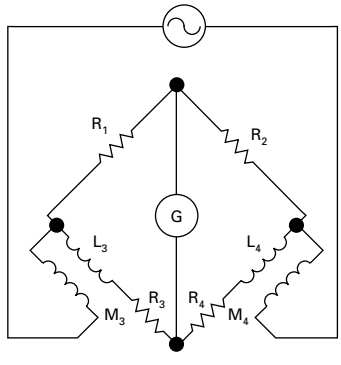
heat, specific *See:* specific heat.

heat tracing (1) (electrical heating systems) A heating system where the externally applied heat source follows (traces) the object to be heated. (IA/PC) 844-1985s

(2) (electrical heat tracing for industrial applications) The utilization of electric heating cables, other electric heating devices, and support components that are externally applied and used to maintain or raise the temperature of fluids in piping and associated equipment. (BT/AV) 152-1953s

heat-transfer aids (electrical heat tracing for industrial applications) Thermally conductive materials, such as metallic foils or heat-transfer cements, used to increase the heat-transfer rates from the heating cables to the process piping or equipment. (BT/IA/AV) 152-1953s, 515-1997

Heaviside-Campbell mutual-inductance bridge A mutual-inductance bridge of the Heaviside type in which one of the inductive arms contains a separate inductor that is included in the bridge arm during the first of a pair of measurements and is short-circuited during the second. *Note:* The balance is independent of the frequency. *See also:* Heaviside mutual-inductance bridge; bridge.



$$R_x = (R_3 - R'_3)\frac{R_2}{R_1}$$

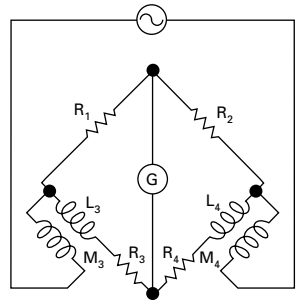
$$L_x = (M - M')\left(1 + \frac{R_2}{R_1}\right)$$

Heaviside-Campbell mutual-inductance bridge

(EEC/PE) [119]

Heaviside-Lorentz system of units A rationalized system based on the centimeter, gram, and second and is similar to the Gaussian system but differs in that a factor 4ν is explicitly inserted to multiply r^2 in each of the formulations of the Coulomb Laws. (Std100) 270-1966w

Heaviside mutual-inductance bridge An alternating-current bridge in which two adjacent arms contain self-inductance, and one or both of these have mutual inductance to the supply circuit, the other two arms being normally nonreactive resistors. *Note:* Normally used for the comparison of self- and mutual inductances. The balance is independent of the frequency. *See also:* bridge.



$$R_1R_4 = R_2R_3$$

$$L_3 - L_4\left(\frac{R_1}{R_2}\right) = -(M_3 - M_4)\left(1 + \frac{R_1}{R_2}\right)$$

Heaviside mutual-inductance bridge

(EEC/PE) [119]

heavy-duty floodlight (hd) (illuminating engineering) A weatherproof unit having a substantially constructed metal housing into which is placed a separate and removable reflector. A weatherproof hinged door with cover glass encloses the assembly but provides an unobstructed light opening at least equal to the effective diameter of the reflector. (IE/EEC) [126]

heavy load *See:* test current.

heavy rail transit A mode of rail rapid transit generally characterized by fully grade-separated construction, operation on exclusive rights-of-way, and station platforms at the floor level of the vehicles. (VT/RT) 1475-1999, 1474.1-1999, 1476-2000

heavy rail vehicle A vehicle operating on a heavy rail transit system. Typically, electrically propelled, bidirectional, capable of operating in multiple unit, and designed for rapid, high-level boarding and discharging of passengers. (VT) 1475-1999, 1476-2000

HE11mode (fiber optics) Designation for the fundamental mode of an optical fiber. *See also:* fundamental mode. (Std100) 812-1984w

height (1) (data management) In a tree, the maximum number of levels between the root node and a terminal node. *Synonym:* depth. *See also:* height-balanced tree. (C) 610.5-1990w

(2) By convention, the height axis is parallel to the connectors. (C/MM) 1101.2-1992

height balance In a tree, the maximum difference in height of any two subtrees of any node. *Note:* A height balance of k is written HB-k. (C) 610.5-1990w

height-balanced *k*-tree A tree whose height balance is k. (C) 610.5-1990w

height-balanced tree A tree whose height balance is 1. *Synonym:* balanced tree. *Contrast:* weight-balanced tree. *See also:* B-tree; Adel'son-Velskii and Landis tree; $n-m$ tree. (C) 610.5-1990w

height-finding radar A radar whose function is to measure the range and elevation angle to a target, thus permitting computation of altitude or height. *Note:* Such a radar usually accompanies a surveillance radar that determines other target parameters. *See also:* nodding-beam height finder; three-dimensional radar. (AES) 686-1997

height gain The variation in electromagnetic field strength above a surface, expressed as gain relative to a fixed reference height. *Notes:* 1. This ratio is generally expressed in decibels and may have a negative value. 2. The reference height may be at the Earth's surface. (AP/PROP) 211-1997

height marker *See:* calibration marks.

helical antenna (data transmission) An antenna whose configuration is that of a helix. *Note:* The diameter, pitch, and number of turns in relation to the wavelength provide control of the polarization state and directivity of helical antennas. (PE/AP/ANT) 599-1985w, 145-1993

helical plate (storage cell) A plate of large area formed by helically wound ribbed strips of soft lead inserted in supporting pockets or cells of hard lead. *See also:* battery. (PE/EEC) [119]

helicopter work A technique of using a helicopter for performing live maintenance on energized wires and equipment, whereby one or more line workers work directly on an energized part using live tools after being raised and bonded to the energized wire or equipment. (T&D/PE) 516-1995

Helmholtz coils A pair of coils proportioned to provide a known uniform magnetic field that may be used to calibrate a probe coil. (COM/TA) 1027-1996

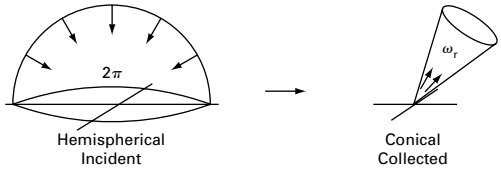
help *See:* help information.

help file A file containing help information. (C) 610.5-1990w

help information Information available for display to the user of a computer system, describing system features and use. *Synonym:* help. *See also:* help menu. (C) 610.2-1987

help menu A menu that gives the user a choice of topics for which help information is available on a given computer system. (C) 610.2-1987

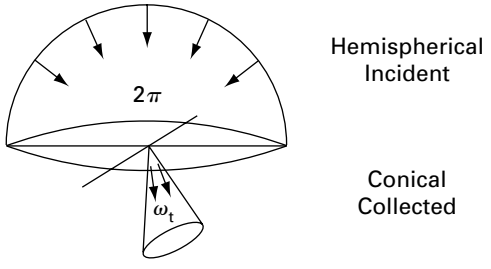
hemispherical-conical reflectance (illuminating engineering) Ratio of reflected flux collected over a conical solid angle to the incident flux from the entire hemisphere. (See corresponding figure.) *Note:* The direction and extent of the cone must be specified.



hemispherical-conical reflectance

(EEC/IE) [126]

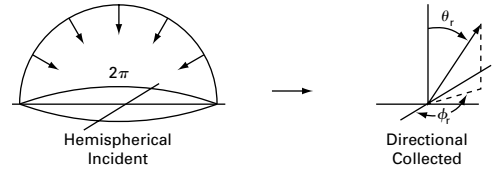
hemispherical-conical transmittance (illuminating engineering) Ratio of transmitted flux collected over a conical solid angle to the incident flux from the entire hemisphere. (See corresponding figure.) *Note:* The direction and extent of the cone must be specified.



hemispherical-conical transmittance

(EEC/IE) [126]

hemispherical-directional reflectance (illuminating engineering) Ratio of reflected flux over an element of solid angle surrounding the given direction to the incident flux from the entire hemisphere. (See corresponding figure.) *Note:* The direction of collection and the size of the solid angle "element" must be specified.



hemispherical-directional reflectance

(EEC/IE) [126]

hemispherical-directional transmittance (illuminating engineering) Ratio of transmitted flux collected over an element of solid angle surrounding the given direction to the incident flux from the entire hemisphere. *Note:* The direction of collection and size of the solid angle "element" must be specified. (EEC/IE) [126]

hemispherical reflectance† **(illuminating engineering)** The ratio of all of the flux leaving a surface or medium by reflection to the incident flux. Note: This term is obsolete, and retained for reference purposes only. (EEC/IE) [126]

† Obsolete.

hemispherical transmittance (illuminating engineering) The ratio of the transmitted flux leaving a surface or medium to the incident flux. *Note:* If transmittance is not preceded by an adjective descriptive of the angles of view, hemispherical transmittance is implied. *See also:* transmission. (EEC/IE) [126]

henry (metric practice) The inductance of a closed circuit in which an electromotive force of one volt is produced when the electric current in the circuit varies uniformly at a rate of one ampere per second. (QUL) 268-1982s

heptode A seven-electrode electron tube containing an anode, a cathode, a control electrode, and four additional electrodes that are ordinarily grids. (ED) 161-1971w

hermetically sealed relay A relay in a gastight enclosure that has been completely sealed by fusion or other comparable means to insure a low rate of gas leakage over a long period of time. *See also:* relay. (EEC/REE) [87]

hermetic motor A stator and rotor without shaft, end shields, or bearings for installation in refrigeration compressors of the hermetically sealed type. (PE) [9]

hermetic refrigerant motor-compressor (air-conditioning and refrigerating equipment) A combination consisting of a compressor and motor, both of which are enclosed in the same housing, with no external shaft or shaft seals, the motor operating in the refrigerant. (NESC/NEC) [86]

hermitian form (1) The nxn matrix is hermitian if its conjugate transpose is equal to itself. In terms of a set of complex variables; x_1, x_2, ... x_n; the quantity

$$[\overline{x_1}\overline{x_2}\ .\ .\ .\ \overline{x_n}][A]\begin{bmatrix} x_1 \\ x_2 \\ \cdots \\ x_n \end{bmatrix}$$

is the hermitian form of [*A*]. (CAS) [13]

(2) (metric practice) The frequency of a periodic phenomenon of which the period is one second. (QUL) 268-1982s

hertz (Hz) (1) (laser maser) The unit which expresses the frequency of a periodic oscillation in cycles per second. (LEO) 586-1980w

(2) The unit of frequency, one cycle per second. (IA/MT) 45-1998

(3) The unit for expressing frequency, f. One hertz equals one cycle per second. (NIR) C95.1-1999

Hertzian electric dipole An elementary source consisting of a time-harmonic electric current element of specified direction and infinitesimal length. *Notes:* 1. The continuity equation relating current to charge requires that opposite ends of the current element be terminated by equal and opposite amounts of electric charge, these amounts also varying harmonically with time. 2. As its length approaches zero, the current must approach infinity in such a manner that the product of current and length remains finite. (AP/ANT) 145-1993

Hertzian magnetic dipole A fictitious elementary source consisting of a time-harmonic magnetic current element of specified direction and infinitesimal length. *Notes:* 1. The continuity equation relating current to charge requires that opposite ends of the current element be terminated by equal and opposite amounts of magnetic charge, these amounts also varying harmonically with time. 2. As its length approaches zero, the current must approach infinity in such a manner that the product of current and length remains finite. 3. A magnetic dipole has the same radiation pattern as an infinitesimally small electric current loop. (AP/ANT) 145-1993

heterodyne (nonlinear, active, and nonreciprocal waveguide components) The process occurring in a frequency converter by which the signal input frequency is changed by superimposing a local oscillation to produce an output having the same modulation information as the original signal but at a frequency which is either the sum or the difference of the signal and local oscillator frequencies. (MTT) 457-1982w

heterodyne conversion transducer (converter) A conversion transducer in which the useful output frequency is the sum or difference of the input frequency and an integral multiple of the frequency of another wave usually derived from a local oscillator. *Note:* The frequency and voltage or power of the local oscillator are parameters of the conversion transducer. Ordinarily, the output-signal amplitude is a linear function of the input-signal amplitude over its useful operating range. (ED) 161-1971w

heterodyne frequency *See:* beats.

heterodyne reception (beat reception) The process of reception in which a received high-frequency wave is combined in a nonlinear device with a locally generated wave, with the result that in the output there are frequencies equal to the sum and difference of the combining frequencies. *Note:* If the received waves are continuous waves of constant amplitude, as in telegraphy, it is customary to adjust the locally generated frequency so that the difference frequency is audible. If the received waves are modulated the locally generated frequency is generally such that the difference frequency is superaudible and an additional operation is necessary to reproduce the original signal wave. *See also:* superheterodyne reception. (PE/EEC) [119]

heterogeneous computer network A computer network of different host computers, such as those of different manufacturers. *Contrast:* homogeneous computer network. (C) 610.7-1995

heterogeneous LAN A network of interconnected LANs of mixed media access control types. *Contrast:* homogeneous local area network. (C) 610.7-1995

heterojunction (fiber optics) A junction between semiconductors that differ in their doping level conductivities, and also in their atomic or alloy compositions. *See also:* homojunction. (Std100) 812-1984w

heteropolar machine (rotating machinery) A machine having an even number of magnetic poles with successive (effective) poles of opposite polarity. *See also:* asynchronous machine; direct-current commutating machine. (PE) [9]

heuristic (1) Pertaining to exploratory methods of problem solving in which solutions are discovered by evaluation of the progress made toward the final result. *See also:* algorithm. (MIL/C) [2], [85], [20]

(2) (modeling and simulation) Pertaining to experimental, especially trial-and-error, methods of problem-solving. *Note:* The resulting solution may not be the most desirable solution to the problem. (C) 610.3-1989w

Hevea rubber Rubber from the Hevea brasiliensis tree. *See also:* insulation.

Hewlett-Packard Graphics Language (HPGL) A page description language used by many laser printers. (C) 610.13-1993w

Hewlett-Packard Printer Control Language A page description language used in many laser printers. (C) 610.13-1993w

hex *See:* hexadecimal.

hexadecimal (A) (mathematics of computing) Pertaining to a selection in which there are sixteen possible outcomes. *Synonym:* sexadecimal. **(B) (mathematics of computing)** Pertaining to the numeration system with a radix of 16. *Synonym:* sexadecimal. (C) 1084-1986

hexadecimal character string A sequence of characters from the set of hexadecimal digits, preceded by the two characters `0x` (zero followed by a lowercase "x"). Hexadecimal character strings shall consist only of the following characters:

0 1 2 3 4 5 6 7 8 9 A B C D E F x

Within software definition files of exported catalogs, all such strings shall be encoded using IRV. (C/PA) 1387.2-1995

hexadecimal digit A numeral used to represent one of the 16 digits in the hexadecimal numeration system; 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, or F. (C) 1084-1986w

hexadecimal notation Any notation that uses the hexadecimal digits and the radix 16. (C) 1084-1986w

hexadecimal number (A) A quantity that is expressed using the hexadecimal numeration system. **(B)** Loosely, a hexadecimal numeral. (C) 1084-1986

hexadecimal number system* *See:* hexadecimal numeration system.

* Deprecated.

hexadecimal numeral A numeral in the hexadecimal numeration system. For example, the hexadecimal numeral 17 is equivalent to the decimal numeral 23. (C) 1084-1986w

hexadecimal numeration system The numeration system that uses the hexadecimal digits and the radix 16. *Synonym:* hexadecimal system. (C) 1084-1986w

hexadecimal point The radix point in the hexadecimal numeration system. (C) 1084-1986w

hexadecimal system *See:* hexadecimal numeration system.

hexadecimal-to-decimal conversion The process of converting a hexadecimal numeral to an equivalent decimal numeral. For example, hexadecimal 8B.4 is converted to decimal 139.25. (C) 1084-1986w

hexlet (1) Sixteen bytes (128 bits) of data. (C/MM) 1754-1994

(2) A 16-byte data format or data type. The name hexadeclet would more accurately describe these 16-byte formats, but for notational convenience this abbreviated term is used throughout this standard. (C/MM) 1596.5-1993

hexode A six-electrode electron tube containing an anode, a cathode, a control electrode, and three additional electrodes that are ordinarily grids. (ED) 161-1971w

HF *See:* high frequency.

HFC *See:* horizontal footcandles.

HF radar *See:* high-frequency radar.

H-frame *See:* crossing structure.

HH *See:* header hub.

hickey (A) A fitting used to mount a lighting fixture in an outlet box or on a pipe or stud. *Note:* It has openings through which fixture wires may be brought out of the fixture stem. **(B)** A pipe-bending tool. (EEC/PE) [119]

HID Abbreviation for high-intensity discharge. *See also:* high-intensity discharge lamp; high-intensity discharge lamps.

HIDAM *See:* hierarchical indexed direct access method.

hidden A general term covering both private and protected. *Contrast:* public. *See also:* private; protected. (C/SE) 1320.2-1998

hidden line A line or line segment in a three-dimensional display image that is not visible because of the presence of surfaces closer to the viewer. *Note:* Such a line may be left invisible or may be displayed as a dashed or dotted line to enhance the realism of the image. (C) 610.6-1991w

hidden line/hidden surface removal A process of detecting hidden lines and hidden surfaces in an image and removing them from the rendering of that image before it is rendered. (C) 610.6-1991w

hidden surface A surface in a three-dimensional graphics display image that is not visible because of the presence of surfaces closer to the viewer. (C) 610.6-1991w

hierarchical Pertaining to a hierarchy, as in a hierarchical database or a hierarchical structure. (C) 610.5-1990w

hierarchical branching A tree-like menu structure that allows selection among alternatives without requiring the opening and closing of a series of menus. The alternatives are contained in one menu. (PE/NP) 1289-1998

hierarchical computer network A computer network in which processing and control functions are performed at several levels by computers suited for the functions performed. (C) 610.7-1995

hierarchical database (A) A database system that uses tree structures to represent the data. **(B)** A database in which data are organized into records, known as segments, that represent nodes in a hierarchy or tree structure. *Note:* Within the hierarchy, a subordinate to a given segment is known as its child segment and a superordinate is known as its parent segment. *Synonym:* sequential precedential database. *Contrast:* relational database; network database. (PE/EDPG) 1150-1991

hierarchical decomposition (software) A type of modular decomposition in which a system is broken down into a hierarchy of components through a series of top-down refinements. *See also:* functional decomposition; stepwise refinement. (C) 610.12-1990

hierarchical direct access method (HDAM) A database access method for hierarchical databases in which pointers maintain the structure itself as well as the control of the storage and retrieval functions of the database. All records are stored and retrieved using these pointers. *Contrast:* hierarchical sequential access method. *See also:* hierarchical indexed direct access method; hierarchical indexed sequential access method. (C) 610.5-1990w

hierarchical indexed direct access method (HIDAM) A database access method for hierarchical databases in which indices access root segments and pointers access dependent segments. *Contrast:* hierarchical indexed sequential access method. (C) 610.5-1990w

hierarchical indexed sequential access method (HISAM) A database access method for hierarchical databases in which indices control access to both root and dependent segments. *Contrast:* hierarchical indexed direct access method. (C) 610.5-1990w

hierarchical input-process-output *See:* input-process-output.

hierarchical instance The concrete appearance of a design unit at some hierarchical level. Because higher-level design units may be instantiated multiple times, a single such appearance may give rise to multiple instances of the lower-level design units within it. Where instances are referred to as "occurrences," hierarchical instances are referred to simply as instances. (C/DA) 1481-1999

hierarchical level A member of a linearly ordered set (i.e., hierarchy) of levels, e.g., a number in the range from 0 to 255. (C/LM) 802.10g-1995, 802.10-1998

hierarchically consecutive An unbroken unidirectional traversal of all nodes between two specified nodes in a tree. All nodes between the origin and destination nodes shall be visited during a traversal. All traversals from any node to its adjacent node shall be made in the same direction, either towards the root of the tree of towards the leaves of the tree. Typically, hierarchically consecutive is taken to imply from ancestral node (closer to the root) to descendent node (closer to the leaves). (C/SE) 1320.1-1998

hierarchical model (A) A data model whose pattern of organization is in the form of a tree structure. **(B)** A data model that provides a tree structure for relating data elements, where each node of the tree corresponds to a group of data elements or a record type, and has only one superior node or parent. (C) 610.5-1990

hierarchical modeling A technique used in computer performance evaluation, in which a computer system is represented as a hierarchy of subsystems, the subsystems are analyzed to determine their performance characteristics, and the results are used to evaluate the performance of the overall system. (C) 610.12-1990

hierarchical random-access memory (HRAM) A type of storage that consists of several layers of varying-speed storage in which information is stored in the fastest available storage. (C) 610.10-1994w

hierarchical routing A routing based on a hierarchical addressing scheme. *Note:* There are five classes of telephony offices in the North America:

- class 1 office: regional center
- class 2 office: sectional center
- class 3 office: primary center
- class 4 office: toll center
- class 5 office: end office

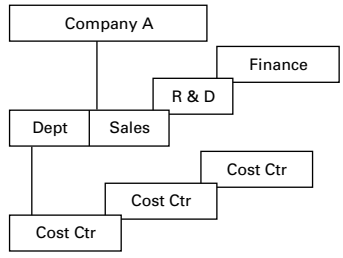
(C) 610.7-1995

hierarchical sequence In a hierarchical database, the sequence of root and dependent segments defined by traversing the database in some specified order. (C) 610.5-1990w

hierarchical sequential access method (HSAM) A database access method for hierarchical databases in which data items are stored and retrieved sequentially. *Contrast:* hierarchical direct access method. *See also:* hierarchical indexed sequential access method. (C) 610.5-1990w

hierarchical structure A collection of entities that are organized in a hierarchical fashion. *Contrast:* network structure. (C) 610.5-1990w

hierarchy (software) (data management) A structure in which components are ranked into levels of subordination; each component has zero, one, or more subordinates; and no component has more than one superordinate component. *See also:* link; hierarchical decomposition; tree; hierarchical modeling; network; data hierarchy.



hierarchy

(C) 610.5-1990w, 610.12-1990

hierarchy chart *See:* structure chart.

high The higher of the two voltages used to convey a single bit of information. For positive logic, a logic 1. (TT/C) 1149.1-1990

high-availability computer A computer designed with various fault tolerant systems that enables it to function when one or more of its components fail. *Note:* A computer is so designated due to its high percentage of user availability. (C) 610.10-1994w

high conduction threshold voltage (metal-nitride-oxide field-effect transistor) The threshold voltage level resulting from a write-high pulse, which puts the transistor into the HC (high-conduction) state. (ED) 581-1978w

high day *See:* time-consistent traffic measures.

high day busy-hour load The one day among the same 10 days that has the highest traffic during the busy hour is designated the (annually recurring) "high day." The traffic level in the busy hour of the high day is termed the HDBH load. (There may be some other hour of the high day or another day of the year with a higher traffic level, but normally it would not be used in the engineering data base.) *See also:* time-consistent traffic measures. (COM/TA) 973-1990w

high-density disk A floppy disk that is capable of storing information at a higher density than that of the same size double-density disk. (C) 610.10-1994w

high dielectric cable Cable that provides high-voltage insulation between conductors, between conductors and shield, and between shield and earth. (PE/PSC) 487-1992

high direct voltage (power cable systems) A direct voltage above 5 000 V supplied by test equipment of limited capacity. (PE/EM/IC) 95-1977r, 400-1991

high-emphasis filtering In image processing, a sharpening technique in which rapid fluctuations in gray levels are emphasized. (C) 610.4-1990w

high-energy piping (nuclear power generating station) Piping serving as the pressure boundary for fluid systems that, during normal plant conditions, are either operating or maintaining temperature or pressure when the maximum operating temperature exceeds 200 F or the maximum operating pressure exceeds 275 pounds per square inch gauge (psig). (PE/NP) 567-1980w

higher layer The conceptual layer of control or processing logic existing in the hierarchical structure of a station that is above the data link layer and upon which the performance of data link layer functions are dependent; for example, device control, buffer allocation, LLC station management, etc. (C/LM/CC) 8802-2-1998

higher-order language (1) (software) A programming language that usually includes features such as nested expressions, user defined data types, and parameter passing not normally found in lower order languages, that does not reflect the structure of any one given computer or class of computers, and that can be used to write machine independent source programs. A single higher order language may represent multiple machine operations. *Synonym:* high-level language. *See also:* computer; assembly language; data type; machine language; source program; programming language. (C/SE) 729-1983s

(2) *See also:* high-order language. (C) 610.13-1993w

higher-order mode (waveguide or transmission line) Any mode of propagation characterized by a field configuration other than that of the fundamental or first-order mode with lowest cutoff frequency. *See also:* waveguide. (IM/HFIM) [40]

higher-order mode of propagation (1) (laser maser) A mode in a beamguide or beam resonator which has a plurality of maxima for the transverse field intensity over the cross-section of the beam. (LEO) 586-1980w

(2) (planar transmission lines) Any mode of propagation characterized by a field configuration other than that of the dominant or first order mode with the lowest cutoff frequency. (MTT) 1004-1987w

higher order service A service that provides a complex behavior of a diagnostic reasoner, possibly defined using a combination of primitive services. (SCC20) 1232.2-1998

high, false, 1 Unasserted state of a bus line. (C/MM) 1196-1987w

high-fidelity signal (speech quality measurements) A signal transmitted over a system comprised of a microphone, amplifier, and loudspeaker or earphones. A tape recorder may be part of the system. All components should be of the best quality the state of the art permits. 297-1969w

high-field-emission arc (gas) An electric arc in which the electron emission is due to the effect of a high electric field in the immediate neighborhood of the cathode, the thermionic emission being negligible. *See also:* discharge. (ED) [45], [84]

high frequencies Frequencies allocated for transmission in the outbound direction. In a mid-split broadband system, approximately 160−300 MHz or higher. (LM/C) 802.7-1989r

high frequency (HF) (1) A radar frequency band between 3 megahertz and 30 megahertz. (AES/RS) 686-1982s

(2) 3−30 MHz. *See also:* radio spectrum. (AP/PROP) 211-1997

high-frequency furnace (coreless-type induction furnace) An induction furnace in which the heat is generated within the charge, or within the walls of the containing crucible, or in both, by currents induced by high-frequency flux from a surrounding solenoid. (PE/EEC) [119]

high-frequency induction heater or furnace A device for causing electric current flow in a charge to be heated, the frequency of the current being higher than that customarily distributed over commercial networks. *See also:* induction heating. (IA) 54-1955w, 169-1955w

high-frequency radar A radar operating at frequencies between 3 to 30 megahertz. (AES/RS) 686-1982s

high frequency radar (radar) A radar operating at frequencies between 3 to 20 MHz. *Synonym:* HF radar. (AES/RS) 686-1982s

high-frequency stabilized arc welder A constant-current arc-welding power supply including a high-frequency arc stabilizer and suitable controls required to produce welding current primarily intended for tungsten-inert-gas arc welding. *See also:* constant-current arc-welding power supply. (EEC/AWM) [91]

high-gain dc amplifier (analog computer) An amplifier that is capable of amplification substantially greater than required for a specified operation throughout a frequency band extending from zero to some maximum. Also, an operational amplifier without feedback circuit elements. *See also:* operational amplifier. (C/Std100) 165-1977w, 610.10-1994w

high-impedance ac system An ac/dc system having low or very low SCR. (PE/T&D) 1204-1997

high-impedance rotor An induction-motor rotor having a high-impedance squirrel cage, used to limit starting current. *See also:* rotor. (PE) [9]

high initial response (excitation systems for synchronous machines) An excitation system capable of attaining 95% of the difference between ceiling voltage and rated-load field voltage in 0.1 s or less under specified condition. (PE/EDPG) 421.1-1986r

high-impedance value (1) The enumeration literal 'Z' of the type STD_ULOGIC defined by IEEE Std 1164-1993. (C/DA) 1076.3-1997

(2) The enumeration literal "Z" of the type STD_ULOGIC (or subtype STD_LOGIC) defined by IEEE Std 1164-1993. (For example, a latch.). (C/DA) 1076.6-1999

high-intensity discharge lamp (illuminating engineering) An electric discharge lamp in which the light producing arc is stabilized by wall temperature, and the arc tube has a bulb wall loading in excess $3 W/cm^2$. HID lamps include groups of lamps known as mercury, metal halide, and high-pressure sodium. *See also:* high-intensity discharge lamps. (EEC/IE) [126]

high-intensity discharge lamps A group of lamps filled with various gases that are generically known as mercury, metal halide, high-pressure sodium, and low-pressure sodium. *See also:* high-intensity discharge lamp. (IA/PSE) 241-1990r

high-key lighting (illuminating engineering) A type of lighting which, applied to a scene, results in a picture having graduations falling primarily between gray and white; dark grays or blacks are present, but in very limited areas. (EEC/IE) [126]

high level A level within the more positive (less negative) of the two ranges of the logic levels chosen to represent the logic states. (GSD/C/BA) 91-1984r, 1496-1993w

high-level data link control (HDLC) (1) A set of Data Link layer communication protocols defined by ISO/IEC 3309: 1993, ISO/IEC 4335: 1993, ISO/IEC 7809: 1993, and ISO/IEC 8885: 1993. These standards define a multiplicity of point-to-point and multidrop protocols. These include both master/slave and peer-to-peer types of data links, employing both half-duplex and full-duplex methodologies. (For the data link portion of this standard, a particular subset, known as TWANRM, is utilized. TWANRM defines a half-duplex master/slave variation of HDLC). (EMB/MIB) 1073.3.1-1994

(2) A standard protocol defined by ISO for bit-oriented, frame-delimited data communications. (C/EMB/MIB) 610.10-1994w, 1073.3.2-2000

high-level data link control protocol A standard protocol, defined by ISO, for bit-oriented, frame-delimited data communication protocol. (C) 610.7-1995

high-level firing time (microwave) (switching tubes) The time required to establish a radio-frequency discharge in the tube after the application of radio-frequency power. *See also:* gas tube. (ED) 161-1971w, [45]

high-level format To prepare a disk or a partition of a disk to be used by a particular operating system. *Note:* In most instances, this includes scanning the surface of the disk for defective areas. *Synonym:* logical format. *Contrast:* low-level format. (C) 610.10-1994w

high-level language (HLL) (1) (high-level microprocessor language) High-level language to be extended by IEEE trial use Std 755-1985. HLLs so extended are sometimes known as implementation languages. (C/MM) 755-1985w
(2) *See also:* high-order language. (C/SE) 729-1983s, 610.13-1993w

high-level modulation Modulation produced at a point in a system where the power level approximates that at the output of the system. (AP/BT/ANT) 145-1983s, 182-1961w

high-level radio-frequency signal (1) (microwave gas tubes) A radio-frequency signal of sufficient power to cause the tube to become fired. *See also:* gas tube. (ED) 161-1971w
(2) (nonlinear, active, and nonreciprocal waveguide components) (microwave gas tubes) A radio-frequency signal above the threshold power level necessary to cause the tube to become nonlinear (fired). *See also:* gas tube. (MTT) 457-1982w

high-level testing (mechanical) Testing performed to determine a damping of complete assemblies, subassemblies, or components. (SUB/PE) C37.122.1-1993

high-level voltage standing-wave ratio (nonlinear, active, and nonreciprocal waveguide components) (microwave switching tubes) The voltage standing-wave ratio caused by a fired tube located between a generator and matched termination in the waveguide. *See also:* gas tube. (ED/MTT) 161-1971w, 457-1982w

highlight (A) A technique in which a display element is emphasized through visual modification such as blinking, brightening, or intensity modulation. **(B)** To draw attention to a display element by visual modification as in definition (A). *See also:* blink. (C) 610.6-1991

high lights (any metal article) Those portions that are most exposed to buffing or polishing operations, and hence have the highest luster. (EEC/PE) [119]

high-limit temperature (1) (electrical heat tracing for industrial applications) The maximum allowable heat-tracing system temperature. (BT/AV) 152-1953s
(2) The maximum allowable temperature, including the piping, the fluid, and the heating system. (IA) 515-1997

high-low signaling (telephone switching systems) A method of loop signaling in which a high-resistance bridge is used to indicate an on-hook condition and a low resistance bridge is used to indicate an off-hook condition. (COM) 312-1977w

high media rate (HMR) Used to indicate a data rate of 100 Mbit/s or greater. (C/LM) 802.5t-2000

high-order Pertaining to the left-most digit or digits of a numeral. (C) 1084-1986w

high-order language (HOL) Any programming language that requires little knowledge of the computer hardware on which a program will run, can be translated into several different machine languages, allows symbolic naming of operations and addresses, provides features designed to facilitate expression of data structures and program logic, and usually results in several machine instructions for each program statement. Examples include Ada, ALGOL, COBOL, FORTRAN, Pascal. *Synonym:* third generation language. *Contrast:* machine language; assembly language; fifth generation language; fourth generation language. (C) 610.13-1993w, 610.12-1990

high-order position The leftmost position in a string; for example, the letter 'A' in 'APPLE' or the digit 9 in 965. *Contrast:* low-order position. *See also:* most significant digit; most significant character. (C) 610.5-1990w

high-pass filter (harmonic control and reactive compensation of static power converters) (data transmission) A filter having a single transmission band extending from some cutoff frequency (not zero) up to infinite frequency. (SP/IA/PE/SPC) 151-1965w, 519-1992, 599-1985w

high peaking The introduction of an amplitude-frequency characteristic having a higher relative response at the higher frequencies. *See also:* television. (BT/AV) [34]

high pot *See:* high-potential test.

high-potential test (power operations) A test that consists of the application of a voltage higher than the rated voltage for a specified time for the purpose of determining the adequacy against breakdown of insulating materials and spacings under normal conditions. *Note:* The test is used as a proof test of new apparatus, a maintenance test on older equipment, or as one method of evaluating developmental insulation systems. *Synonym:* high pot. (PE/PSE) 858-1987s

high-power-factor mercury-lamp ballast A multiple-supply type power-factor-corrected ballast, so designed that the input current is at a power factor of not less than 90 percent when the ballast is operated with center rated voltage impressed upon its input terminals and with a connected load, consisting of the appropriate reference lamp(s), operated in the position for which the ballast is designed. (EEC/LB) [97]

high-power−factor transformer (power and distribution transformers) A high-reactance transformer that has a power-factor-correcting device, such as a capacitor, so that the input current is at a power factor of not less than 90% when the transformer delivers rated current to its intended load device. *See also:* specialty transformer. (PE/TR) C57.12.80-1978r, [116]

high-pressure contact (as applied to high-voltage disconnecting switches) One in which the pressure is such that the stress in the material of either of the contact surfaces is near the elastic limit of the material so that conduction is a function of pressure. (SWG/PE) C37.100-1992

high-pressure sodium lamp (illuminating engineering) A high intensity discharge (HID) lamp in which light is produced by radiation from sodium vapor operating at a partial pressure about 1.33×10^4Pa (100Torr). Includes clear and diffuse-coated lamps. (EEC/IE) [126]

high-pressure vacuum pump A vacuum pump that discharges at atmospheric pressure. *See also:* rectification. (EEC/PE) [119]

high profile Terminations or connections designed for use outside of thermal insulation, or away from the surface being heated. (IA/PC) 515.1-1995

high-profile connection Terminations or connections designed for use outside of the thermal insulation, or away from the surface being heated. (IA) 515-1997

high-pulse-repetition frequency A pulsed-radar system whose pulse-repetition frequency is such that targets of interest are ambiguous with respect to range. *See also:* MPRF. (AES/RS) 686-1990

high-pulse-repetition-frequency waveform A waveform whose pulse-repetition frequency (PRF) is high enough to have no Doppler ambiguities for a given maximum-speed target. *See also:* low-pulse-repetition-frequency waveform; medium-pulse-repetition-frequency waveform. (AES) 686-1997

high-purity germanium (HPGe) Germanium with a low, net electrically active, uncompensated defect concentration usually less than $\approx 10^{10}$ cm^{-3}. (NPS) 325-1996

high-rate charge The application of a constant potential charge, at a higher level than the float charge, to a partially or fully discharged battery to recharge it. (PE/EDPG) 1106-1995

high-reactance rotor An induction-motor rotor having a high-reactance squirrel cage, used where low starting current is required and where low locked-rotor and breakdown torques are acceptable. *See also:* rotor. (PE) [9]

high-reactance transformer (power and distribution transformers) An energy-limiting transformer that has sufficient inherent reactance to limit the output current to a maximum value. *See also:* specialty transformer. (PE/TR) C57.12.80-1978r, [57]

(2) (A) (secondary short-circuit current rating) The current in the secondary winding when the primary winding is connected to a circuit of rated primary voltage and frequency and when the secondary terminals are short-circuited. **(B)** (kilovolt-ampere or voltampere short-circuit input rating) The input kilovolt-amperes or volt-amperes at rated primary voltage with the secondary terminals short-circuited. (PE/TR) [57]

high-resistance rotor (rotating machinery) An induction motor rotor having a high-resistance squirrel cage, used when reduced locked-rotor current and increased locked-rotor torque are required. (PE) [9]

high-resistance sheath A metallic covering with a characteristic resistance at a level high enough to prevent usage as an effective ground path. More specifically, it is a metallic covering that either does not have a conductance greater than or equal to that of the largest conductor under evaluation, based on the resistance of an equivalent sized copper conductor, or is incapable of passing an overcurrent test at levels of 1.10, 1.35, and 2.00 times the maximum branch circuit overcurrent protection for 7 h, 1 h, and 2 min, respectively. (IA/PC) 515.1-1995

high rupturing capacity (HRC) (protection and coordination of industrial and commercial power systems) In British and Canadian terminology, high rupturing capacity, equivalent to USA high interrupting capacity and generally indicating capability of interruption of at least 100 000 root-mean-square (rms) amperes (A) for low-voltage fuses. (IA/PSP) 242-1986r

high-speed buffer A cache or a set of logically partitioned blocks that provides significantly faster access to instructions and data than provided by main storage. (C) 610.10-1994w

high-speed carry (1) (electronic computation) A carry process such that if the current sum in a digit place is exactly one less than the base, the carry input is bypassed to the next place. *Note:* The processing necessary to allow the bypass occurs before the carry input arrives. Further processing required in the place as a result of the carry input, occurs after the carry has passed by. *Contrast:* cascaded carry. *See also:* standing-on-nines carry. (C) 162-1963w

(2) (mathematics of computing) A carry process in which, if the current sum in a given digit place is one less than the base, the sum is set to zero and the carry input is passed to the next place. *Contrast:* cascaded carry. *See also:* standing-on-nines carry. (C) 1084-1986w

high-speed excitation system An excitation system capable of changing its voltage rapidly in response to a change in the excited generator field circuit. *See also:* generating station. (PE/T&D) [10]

high-speed grounding switch *See:* fault-initiating switch.

high-speed limit (control systems for steam turbine-generator units) (speed/load reference) A device or input that limits the speed/load reference setting to a predetermined upper limit. This device may establish the upper limit of the synchronizing speed range. (PE/EDPG) 122-1985s

high-speed low-voltage dc power circuit breaker (1) A low-voltage dc power circuit breaker which, during interruption, limits the magnitude of the fault current so that its crest is passed not later than a specified time after the beginning of the fault current transient, where the system fault current, determined without the circuit breaker in the circuit, falls between specified limits of current at a specified time. *Note:* The specified time in present practice is 0.01 second. (SWG/PE) C37.100-1981s

(2) (low-voltage dc power circuit breakers used in enclosures) A circuit breaker which, when applied in a circuit with the parameter values specified in American National Standard C37.16-1979, Preferred Rating, Related Requirements and Application Recommendations for Low-Voltage Power Circuit Breakers and AC Power Circuit Protectors, Tables 12 and 12A, tests "b" (5 A/μS initial rate of rise of current), forces a current crest during interruption within 0.01 s after the current reaches the pickup setting of the instantaneous trip device. *Note:* For total performance characteristics at other than test circuit parameter values, consult the manufacturer. (SWG/PE) C37.14-1979s

high-speed metal-oxide semiconductor (HMOS) *See:* n-channel metal-oxide semiconductor.

high-speed printer (HSP) A printer that operates at a very high speed. (C) 610.10-1994w

high-speed regulator (power supplies) A power supply regulator circuit that, by the elimination of its output capacitor, has been made capable of much higher slewing rates than are normally possible. *Note:* High-speed regulators are used where rapid step-programming is needed: or as current regulators, for which they are ideally suited. *See also:* slewing rate. (AES) [41]

high-speed relay A relay that operates in less than a specified time. *Note:* The specified time in present practice is 50 ms (three cycles on a 60 Hz basis). (SWG/PE) C37.100-1992

high-speed short-circuiting switch *See:* fault-initiating switch.

high-split A frequency division scheme that allows two-way traffic on a single cable. Inbound path signals come to the headend from 5 to 174 MHz. Outbound path signals go from the headend from 234 MHz to the upper frequency limit. The guardband is located from 174 to 234 MHz. (LM/C) 802.7-1989r

high state (1) (programmable instrumentation) The relatively more-positive signal level used to assert a specific message content associated with one of two binary logic states. (IM/AIN) 488.1-1987r

(2) (signals and paths) (SBX bus) (microcomputer system bus) (STEbus) The more positive voltage level used to represent one of two logical binary states. (C/MM) 796-1983r, 959-1988r, 1000-1987rr

(3) (696 interface devices) (signals and paths) The electrically more positive signal level used to assert a specific message content associated with one of two binary logic states. (MM/C) 696-1983w

high symbol An idle symbol that has been marked for consumption by highest-priority nodes. Sometimes called high-idle symbol. (C/MM) 1596-1992

high-temperature Used to describe materials, insulation systems, and transformers that are designed to operate at a maximum hottest-spot temperature above 120C. (PE/TR) 1276-1997

high-temperature insulation system An insulation system composed of all high-temperature solid insulation materials, with or without high-temperature fluids. (PE/TR) 1276-1997

high-usage trunk (data transmission) A group of trunks for which an engineered alternate route is provided, and for which the number of trunks is determined on the basis of relative trunk efficiencies and economic considerations. (PE) 599-1985w

high-usage trunk group (telephone switching systems) A trunk group engineered on the basis of relative trunk efficiencies and economic considerations which will overflow traffic. (COM) 312-1977w

high-velocity camera tube (anode-voltage stabilized camera tube) A camera tube operating with a beam of electrons having velocities such that the average target voltage stabilizes at a value approximately equal to that of the anode. (ED) [45]

high-velocity scanning (electron tube) The scanning of a target with electrons of such velocity that the secondary-emission rate is greater than unity. *See also:* television. (ED) 161-1971w

high voltage (hv) (1) (electric power systems in commercial buildings) (system voltage ratings) A class of nominal system voltages equal to or greater than 100 000 V and equal to or less than 230 000 V. *See also:* nominal system voltage; medium voltage; low voltage. (IA/PSE/APP) 241-1990r, [80]

(2) A term applied to voltage levels that are greater than 1000 V. (T&D/PE) 516-1995

high-voltage aluminum-sheathed power cable (aluminum sheaths for power cables) Cable used in an electric system having a maximum phase-to-phase rms ac voltage above 72 500 V to 242 000 V, the cable having an aluminum sheath as a major component in its construction. (PE/IC) 635-1989r

high-voltage and low-voltage windings (power and distribution transformers) The terms high voltage and low voltage are used to distinguish the winding having the greater from that having the lesser voltage rating. (PE/TR) C57.12.80-1978r

high-voltage cable termination A device used for terminating alternating-current power cables having laminated or extruded insulation rated 2.5 kV and above, which are classified according to the following:

a) Class 1 termination: Provides electric stress control for the cable insulation shield terminus; provides complete external leakage insulation between the cable conductor(s) and ground; and provides a seal to the end of the cable against the entrance of the external environment and maintains the operating design pressure, if any, of the cable system. This class is divided into three types:
   — Class 1A: For use on extruded dielectric cable
   — Class 1B: For use on laminated dielectric cable
   — Class 1C: Expressly for pressure-type cable systems

b) Class 2 termination: Provides electric stress control for the cable insulation shield terminus, and provides complete external leakage insulation between the cable conductor(s) and ground.

c) Class 3 termination: Provides electric stress control for the cable insulation shield terminus.

Note: Some cables below 15 kV do not have an insulation shield. Terminations for such cables would not be required to provide electric stress control. In such cases, this provision would not be part of the definition. (PE/IC) 48-1996

high-voltage disconnect jack A device used to disconnect cable pairs for testing purposes. Used to help safeguard personnel from remote ground potentials. (PE/PSC) 487-1992

high-voltage isolating relay A device that provides for the repeating of dc on/off signals while maintaining longitudinal isolation. High-voltage isolating relays may be used in conjunction with isolating transformers or may be used as standalone devices for dc tripping or dc telemetering. (PE/PSC) 487-1992

high-voltage power vacuum interrupter (X-radiation limits for ac high-voltage power vacuum interrupters used in power switchgear) An interrupter in which the separable contacts function within a single evacuated envelope and which is intended for use in power switchgear. 553-1980

high-voltage relay (A) A relay adjusted to sense and function in a circuit or system at a specific maximum voltage. **(B)** A relay designed to handle elevated voltages on its contacts, coil, or both. (SWG) 341-1980

high-voltage system An electric system having a maximum root-mean-square ac voltage above 72.5 kV. (PE/EDPG) 665-1995

high-voltage telephone repeater (wire-line communication facilities) A high-voltage telephone repeater provides high-voltage longitudinal isolation, while permitting voice and signalling to pass. This is accomplished by using a short span, carrier transmission system and high-voltage, isolation capacitors or transformers. The repeater is intended to provide ordinary telephone service in a power station environment without interference to other noninterruptible, critical circuits. (PE/PSC) 487-1980s

high-voltage time test An accelerated life test on a cable sample in which voltage is the factor increased. (PE/T&D) [10]

highway (CAMAC system) An interconnection between CAMAC crate assemblies or between one or more CAMAC crate assemblies and an external controller. (NPS) 583-1975s

highway crossing back light (railway practice) An auxiliary signal light used for indication in a direction opposite to that provided by the main unit of a highway crossing signal. (EEC/PE) [119]

highway crossing bell (railway practice) A bell located at a railroad-highway grade crossing and operated to give a characteristic and arrestive signal to give warning of the approach of trains. (EEC/PE) [119]

highway crossing signal An electrically operated signal used for the protection of highway traffic at railroad-highway grade crossings. (EEC/PE) [119]

high-Z A condition in which the driver on a pin is inactive. The state of a net attached to a pin that is at high-Z is determined by values applied to other parts of the net. *Contrast:* CD state. *See also:* net; core disconnect. (C/TT) 1149.4-1999

Hilbert transform (harmonic conjugate) (real functional $x(t)$ of the real variable t) The real function $x(t)$ that is the Cauchy principal value of

$$\frac{1}{\pi}\int_{-\infty}^{\infty}\frac{X(\tau)d\tau}{t-\tau}$$

This transformation shifts all Fourier components by $90°-\cos\omega^t$, for example, into $\sin\omega^t$ and $\sin\omega t$ into $-\cos\omega^t$. *See also:* network analysis. (IT) [7]

hinge axis *See:* output axis.

hinge clip (of a switching device) The clip to which the blade is movably attached. (SWG/PE) C37.100-1992

hinged-iron ammeter A special form of moving-iron ammeter in which the fixed portion of the magnetic circuit is arranged so that it can be caused to encircle the conductor, the current in which is to be measured. This conductor then constitutes the fixed coil of the instrument. *Note:* The combination of a current transformer of the split-core type with an ammeter is often used similarly to measure alternating current, but should be distinguished from the hinged-iron ammeter. *See also:* instrument. (EEC/PE) [119]

hinged removable feed tube (cable plowing) A feed tube removably attached to a blade so relative motion may occur between the feed tube and the blade around an essentially vertical axis. (PE/T&D) 590-1977w

hipot (test, measurement, and diagnostic equipment) A colloquialism for high potential test: A testing technique whereby a high voltage source is applied to an insulating material to determine the condition of that material. (MIL) [2]

HIS *See:* health information system; hospital information system.

HISAM *See:* hierarchical indexed sequential access method.

hiss Noise in the audio-frequency range, having subjective characteristics analogous to prolonged sibilant sounds. (SP/ED) 151-1965w, [45]

historical data All relevant information available concerning the product, tests, and test equipment. This includes test observations (raw measurement data), derived test outcomes (i.e., LO, HI, GO), diagnostic conclusions derived from test results and the knowledge base, test subject mission and configuration history, test resources mission and history, etc. (SCC20) 1226-1998

hit (1) (A) A comparison of two items of data that satisfies specified conditions; for example, when comparing "X" with the string "ACDFXYN", a hit would be encountered in the fifth character position. **(B)** In disk caching, a condition where the target data is located within the cache storage, eliminating the need to reference secondary storage. *Synonym:* cache hit. *See also:* hit ratio; hit probability. (C) 610.10-1994

(2) (A) (telecommunications) A short on-hook signal that does not initiate any call-processing functions. *See also:* flash; hit, flash, and disconnect timing; disconnect. **(B)** An on-hook/off-hook sequence that is too short to be accepted by the system as a valid on-hook/off-hook signal. (COM/TA) 973-1990

(3) (A) (data management) In a search, the condition that occurs when the key value of an item is equal to the search argument; that is, a successful search results in a hit. **(B)** A record that produces the condition in definition (A); for example, a student record in which the student's home state matches the home state being searched for. *Contrast:* match. (C) 610.5-1990

(4) A target echo from one single pulse. (AES) 686-1997

hit file A file containing all records that resulted from a successful search. (C) 610.5-1990w

hit, flash, and disconnect timing The duration of an on-hook signal shorter than, between, or longer than certain bounds, which determines whether the signal is a hit, a flash, or a disconnect signal. During a stable call, the switching system may receive a disconnect signal from either the calling or called party. A disconnect signal is the change from an off-hook to on-hook state that persists beyond a prescribed time limit and that may last indefinitely thereafter. *See also:* flash; hit; disconnect. (COM/TA) 973-1990w

hit probability The probability that a cache storage contains the target data. *Note:* generally expressed in percent. (C) 610.10-1994w

hit ratio (1) In a search, the number of hits divided by the total number of items searched. (C) 610.5-1990w

(2) The proportion of cache hits to all accesses. (C) 610.10-1994w

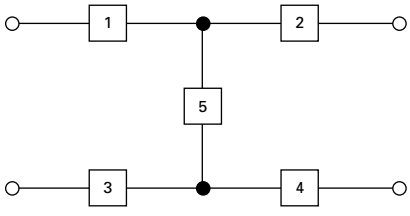
hit timing *See:* hit, flash, and disconnect timing; hit; disconnect; flash.

HLL *See:* high-level language; high-order language.

HMI *See:* human-machine interface.

HMOS *See:* high-speed metal-oxide semiconductor.

H network A network composed of five branches, two connected in series between an input terminal and an output terminal, two connected in series between another input terminal and output terminal, and the fifth connected from the junction point of the first two branches to the junction point of the second two branches. *See also:* network analysis.



Branches 1 and 2 are the first two branches between an input and an output terminal; branches 3 and 4 are the second two branches; and branch 5 is the branch between the junction points.

H network

(Std100) 270-1966w

hoarfrost A deposit of interlocking ice crystals (hoar crystals) formed by direct sublimation on objects, usually those of small diameter freely exposed to the air such as tree branches, plant stems and leaf edges, wires, poles, etc. The deposition of hoarfrost on an object is similar to the process by which dew is formed, except that the temperature of the object must be below freezing. It forms when air with a dew point below freezing is brought to saturation by cooling. (T&D/PE) 539-1990

hodoscope An apparatus for tracing the path of a charged particle in a magnetic field. *See also:* electron optics. (ED) [45], [84]

Hoeppner connection (power and distribution transformers) A three-phase transformer connection involving transformation from a wye winding to the combination of a delta winding and a zigzag winding which are connected permanently in parallel. *Note:* This connection is used when a wye-delta connection is needed, with ground connections on both primary and secondary windings. (PE/TR) C57.12.80-1978r

hoghorn antenna A reflector antenna consisting of a sectoral horn that physically intersects a reflector in the form of a parabolic cylinder, a part of one of the nonparallel sides of the horn being removed to form the antenna aperture. (AP/ANT) 145-1993

hoist An apparatus for moving a load by the application of pulling force (not including a car or platform running in guides). These devices are normally designed using roller or link chain and built-in leverage to enable heavy loads to be lifted or pulled. They are often used to dead-end a conductor during sagging and clipping-in operations and when tensioning guys *Synonyms:* Coffing; chain tugger; coffin hoist; chain hoist; Coffing hoist; puller; drum. (T&D/PE) 524a-1993r, 524-1992r, 516-1995

hoist back-out switch A switch that permits operation of the hoist only in the reverse direction in case of overwind. *See also:* mine hoist. (EEC/PE/MIN) [119]

hoist, double drum *See:* puller, two drum, three drum.

hoisting-rope equalizer A device installed on an elevator car or counterweight to equalize automatically the tensions in the hoisting wire ropes. *See also:* elevator. (EEC/PE) [119]

hoist overspeed device A device that can be set to prevent the operation of a mine hoist at speeds greater than predetermined values and usually causes an emergency brake application when the predetermined speed is exceeded. *See also:* mine hoist. (EEC/PE/MIN) [119]

hoist overwind device A device that can be set to cause an emergency break application when a cage or skip travels beyond a predetermined point into a danger zone. *See also:* mine hoist. (EEC/PE/MIN) [119]

hoist signal code Consists of prescribed signals for indicating to the hoist operator the desired direction of travel and whether men or materials are to be hoisted or lowered in mines. *See also:* mine hoist. (EEC/PE/MIN) [119]

hoist signal system A system whereby signals can be transmitted to the hoist operator (and in some instances by him to the cager) for control of mine hoisting operations. *See also:* mine hoist. (EEC/PE/MIN) [119]

hoist, single drum *See:* drum puller.

hoist slack-brake switch A device for automatically cutting off the power from the hoist motor and causing the brake to be set in case the links in the brake rigging require tightening or the brakes require relining. *See also:* mine hoist. (PE/EEC/MIN) [119]

hoist, triple drum *See:* puller, two drum, three drum.

hoist trip recorder A device that graphically records information such as the time and number of hoists made as well as the delays or idle periods between hoists. *See also:* mine hoist. (EEC/PE/MIN) [119]

hoistway Any shaftway, hatchway, well hole, or other vertical opening or space in which an elevator or dumbwaiter is designed to operate. (NESC/NEC) [86]

hoistway access switch (elevators) A switch, located at a landing, the function of which is to permit operation of the car with the hoistway door at this landing and the car door or gate open, in order to permit access at the top of the car or to the pit. *See also:* control. (PE/EEC) [119]

hoistway-door combination mechanical lock and electric contact (elevators) A combination mechanical and electric device, the two related, but entirely independent, functions of which are: To prevent operation of the driving machine by the normal operating device unless the hoistway door is in the closed position, and to lock the hoistway door in the closed position and prevent it from being opened from the landing side unless the car is within the landing zone. *Note:* As there is no positive mechanical connection between the electric contact and the door-locking mechanism, this device insures only that the door will be closed, but not necessarily locked, when the car leaves the landing. Should the lock mechanism fail to operate as intended when released by a stationary or retiring car-cam device, the door can be opened from the landing side even though the car is not at the landing. If operated by a stationary car-cam device, it does not prevent opening the door from the landing side as the car passes the floor. *See also:* hoistway. (EEC/PE) [119]

hoistway-door electric contact (elevators) An electric device, the function of which is to prevent operation of the driving machine by the normal operating device unless the hoistway door is in the closed position. *See also:* hoistway. (EEC/PE) [119]

hoistway-door interlock (elevators) A device having two related and interdependent functions that are (1) to prevent the operation of the driving machine by the normal operating device unless the hoistway door is locked in the closed position: and (2) to prevent the opening of the hoistway door from the landing side unless the car is within the landing zone and is either stopped or being stopped. *See also:* hoistway. (EEC/PE) [119]

hoistway-door or gate locking device (elevators) A device that secures a hoistway or gate in the closed position and prevents it from being opened from the landing side except under specified conditions. *See also:* hoistway. (PE/EEC) [119]

hoistway enclosure The fixed structure, consisting of vertical walls or partitions, that isolates the hoistway from all other parts of the building or from an adjacent hoistway and in which the hoistway doors and door assemblies are installed. *See also:* hoistway. (EEC/PE) [119]

hoistway-gate separate mechanical lock (elevators) A mechanical device, the function of which is to lock a hoistway gate in the closed position after the car leaves a landing and prevent the gate from being opened from the landing side unless the car is within the landing zone. *See also:* hoistway. (PE/EEC) [119]

hoistway-unit system (elevators) A series of hoistway-door interlocks, hoistway-door electric contacts, or hoistway-door combination mechanical locks and electric contacts, or a combination thereof, the function of which is to prevent operation of the driving machine by the normal operating device unless all hoistway dobrs are in the closed position and, where so required, are locked in the closed position. *See also:* hoistway. (PE/EEC) [119]

HOL *See:* high-order language.

hold (1) An untimed delay in the program, terminated by an operator or interlock action. (C/IA) [61]

(2) (analog computer) In an analog computer, the computer control state in which the problem solution is stopped and held at its last values usually by automatic disconnect of integrator input signals. (C) 165-1977w

(3) A control function that arrests the further speed change of a drive during the acceleration or deceleration portion of the operating cycle. *See also:* feedback control system. (IA/ICTL/IAC) [60]

(4) To maintain storage elements at an equilibrium voltage by electron bombardment. *See also:* charge-storage tube; data processing. (ED) 161-1971w, 158-1962w

(5) (A) (test, measurement, and diagnostic equipment) The function of retaining information in one storage device after transferring it to another device; and. **(B) (test, measurement, and diagnostic equipment)** A designed stop in testing. (MIL) [2]

(6) (data management) When performing a get operation on a record, to lock the record for update by the requesting process at the same time the get operation is performed. (C) 610.5-1990w

(7) (A) An untimed delay in a computer program, terminated by an operator or an interlock operation. **(B)** In an analog computer, the computer control state in which the problem solution is stopped and held at its last values, usually by automatic disconnect of integrator input signals. (C) 610.10-1994

hold card *See:* hold out.

hold-closed mechanism (automatic circuit recloser) A device that holds the contacts in the closed position following the completion of a predetermined sequence of operations as long as current flows in excess of a predetermined value. (SWG/PE) C37.100-1981s, [56]

hold-closed operation (automatic circuit recloser) An opening followed by the number of closing and opening operations that the hold-closed mechanism will permit before holding the contacts in the closed position. (SWG/PE) C37.100-1981s

hold-down bail (separable insulated connectors) An externally mounted device designed to prevent separation at the operating interface of an elbow and an apparatus bushing. (T&D/PE) 386-1995

hold-down block (conductor stringing equipment) A device designed with one or more single groove sheaves to be placed on the conductor and used as a means of holding it down. This device functions essentially as a traveler used in an inverted position. It is normally used in midspan to control conductor uplift caused by stringing tensions, or at splicing locations to control the conductor as it is allowed to rise after splicing is completed. *Synonyms:* roller, hold-down; traveler, hold-down; splice release block. (T&D/PE) 524-1992r

holding amplifier A receiver circuit incorporating feedback that maintains the present input logic level in the absence of any other drive signals on the signal line. (C/BA) 1496-1993w

holding current (thyristor) The minimum principal current required to maintain the thyristor in the ON-state, after latching current has been reached and after removal of gate signal. *See also:* latching current. (IA/IPC) 428-1981w

holding-down bolt A bolt that fastens a machine to its bedplate, rails, or foundation. (PE) [9]

holding frequency (take the swings) A condition of operating a generator or station to maintain substantially constant frequency irrespective of variations in load. *Note:* A plant so operated is said to be regulating frequency. *See also:* generating station. (PE/T&D/PSE) 94-1970w, [10]

holding load A condition of operating a generator or station at substantially constant load irrespective of variations in frequency. *Note:* A plant so operated is said to be operating on base load. *See also:* base load; generating station. (T&D/PE) [10]

holding register (hybrid computer linkage components) The register, in a double-buffered digital-to-analog converter (DAC) or a digital-to-analog multiplier (DAM), that holds the next digital value to be transferred into the dynamic register. (C) 166-1977w

holding time (1) (data transmission) The length of time a communication channel is in use for each transmission. Includes both message time and operating time. (PE) 599-1985w

(2) The interval of time within which the decrease of the test voltage due to leakage, prior to the discharge, is not greater than 10% when measured with an instrument that has a dc resistance greater than 10^{16} Ω and a capacitance less than 10 pF. (EMC) C63.16-1993

holding tone (1) (telecommunications) A test tone in the range of 1002 to 1020 Hz, having specific requirements as specified in IEEE Std 743-1984. The level of the holding tone is specified as part of the test requirement. The tone is used to measure analog circuit impairments. (COM/TA) 1007-1991r

(2) The tone, near 1 kHz, transmitted over a telecommunication circuit for performing noise-with-tone, jitter, and transient impairment measurements. (COM/TA) 743-1995

hold off *See:* suspension of reclosing.

hold-off diode (charging inductors) A diode that is placed in series with the charging inductor and connected to the common junction of the switching element and the pulse-forming network in a pulse generator. *Note:* The use of a hold-off diode in the charging circuit of a pulse-forming network allows the capacitors of the network to charge to full voltage and remain at this voltage until the switch conducts. This permits the use of pulse-repetition frequencies of equal to or less than twice the frequency of resonance charging. (MAG) 306-1969w

hold order *See:* suspension of reclosing.

hold out Operating order, operating-order identification tag, or marker *Synonym:* hold card. (T&D/PE) 516-1995

hold time (1) The total time that a trunk, channel, or circuit is occupied by a call. (C) 610.7-1995

(2) (A) The amount of time information may be retained in dynamic storage before needing to be refreshed or the information lost. *Synonym:* output hold time. **(B)** The elapsed time during which a program is on hold. **(C)** The amount of time during which data presented to a flip-flop must be maintained after the clock transition in order for the data to be accurately stored. (C) 610.10-1994

(3) *See also:* setup/hold timing check; nochange timing check. (C/DA) 1481-1999

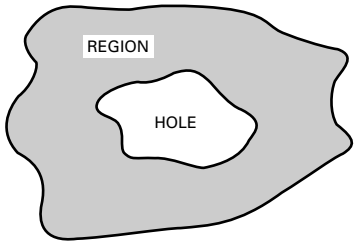
hold timing check A timing check that establishes only the end of the stable interval for a setup/hold timing check. If no setup timing check is provided for the same arc, transitions, and state, the stable interval is assumed to begin at the reference signal transition and a negative value for the hold time is not meaningful. *See also:* setup/hold timing check. (C/DA) 1481-1999

holdup-alarm attachment A general term for the various alarm-initiating devices used with holdup-alarm systems, including holdup buttons, footrails, and others of a secret or unpublished nature. *See also:* protective signaling. (EEC/PE) [119]

holdup-alarm system An alarm system signaling a robbery or attempted robbery. *See also:* protective signaling. (EEC/PE) [119]

hole (1) (semiconductor) A mobile vacancy in the electronic valence structure of a semiconductor that acts like a positive electron charge with a positive mass. *See also:* semiconductor. (ED) 216-1960w

(2) (image processing and pattern recognition) In image processing, a connected component of the complement of a region, that is surrounded by the region.



hole

(C) 610.4-1990w

(3) In a semiconductor, a conceptual unit of charge opposite to that of an electron. *Note:* A hole occurs when an electron is lost from an atom, and "moves" when an electron is lost from an adjacent atom. (C) 610.10-1994w

hole burning (laser maser) (of an absorption or an emission line) The frequency dependent saturation of attenuation or gain that occurs in an inhomogeneously broadened transition when the saturating power is confined to a frequency range small compared with the inhomogeneous linewidth. (LEO) 586-1980w

hole pattern A punching configuration or an array of holes that represent a single character in a data medium such as paper tape, or punch cards. (C) 610.10-1994w

Hollerith card *See:* punch card.

hollow-core annular conductor (hollow-core conductor) A conductor composed of a plurality of conducting elements disposed around a supporting member that does not fill the space enclosed by the elements: alternatively, a plurality of such conducting elements disposed around a central channel and interlocked one with the other or so shaped that they are self-supporting. *See also:* conductor. (T&D/PE) [10]

hollow-core conductor *See:* hollow-core annular conductor.

home address The information written on every track of a magnetic disk, identifying the relative track number of that track. (C) 610.10-1994w

home area (telephone switching systems) The numbering plan area in which the calling customer is located. (COM) 312-1977w

home computer A personal computer designed to be used in the home. (C) 610.2-1987, 610.10-1994w

home directory The current directory associated with a user at the time of login. (C/PA) 9945-2-1993

home key (A) A cursor control key that moves the cursor to the starting point of the screen, usually the upper left-hand corner. **(B)** A cursor control key that moves the cursor to the starting point of a file. (C) 610.10-1994

home signal (railway practice) A fixed signal at the entrance of a route or block to govern trains or engines entering or using that route or block. (EEC/PE) [119]

homing (1) (navigation) Following a course directed toward a point by maintaining constant some navigational coordinate (other than altitude). *See also:* radio navigation. (AES/RS) 686-1982s, [42]

(2) (telephone switching systems) Resetting of a sequential switching operation to a fixed starting point. (COM) 312-1977w

homing beacon (navigation aid terms) A beacon that provides homing guidance. (AES/GCS) 172-1983w

homing guidance That form of missile guidance wherein the missile steers itself toward a target by means of a mechanism actuated by some distinguishing characteristic of the target. *See also:* guided missile. (EEC/PE) [119]

homing relay A stepping relay that returns to a specified starting position prior to each operating cycle. *See also:* relay. (EEC/REE) [87]

homochromatic gain (optoelectronic device) The radiant gain or luminous gain for specified identical spectral characteristics of both incident and emitted flux. *See also:* optoelectronic device. (ED) [46]

homodyne reception (zero-beat reception) A system of reception by the aid of a locally generated voltage of carrier frequency. (EEC/PE) [119]

homogeneous cladding (fiber optics) That part of the cladding wherein the refractive index is constant within a specified tolerance, as a function of radius. *See also:* cladding; tolerance field. (Std100) 812-1984w

homogeneous computer network A computer network of similar host computers, such as those of one model by the same manufacturer. *Contrast:* heterogeneous computer network. (C) 610.7-1995

homogeneous dense medium Medium in which the refractive index is significantly different from that of a vacuum. *See also:* sparse medium. (AP/PROP) 211-1997

homogeneous Helmholtz equation The wave equation for the electromagnetic potential, Φ, given by:

$$(\nabla^2 + k^2)\Phi = 0$$

where k is the wavenumber in the medium. The homogeneous Helmholtz equation is also the scalar wave equation for a scalar component of the electric field represented by Φ. *Note:* Sometimes k^2 is replaced by $-\gamma^2$, where γ is the propagation constant. (AP/PROP) 211-1997

homogeneous LAN *See:* homogeneous local area network.

homogeneous 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, collisions, lattice vibrations, etc.) which is the same for each of the emitters. (LEO) 586-1980w

homogeneous local area network (homogeneous LAN) A network of interconnected LANs, all of which use the same media access control type. *Contrast:* heterogeneous LAN. (C) 610.7-1995

homogeneous medium A medium whose properties are spatially invariant. (AP/PROP) 211-1997

homogeneous redundancy In fault tolerance, realization of the same function with identical means, for example, use of two identical processors. *Contrast:* diversity. (C) 610.12-1990

homogeneous plane wave A wave in which the planes of constant magnitude and constant phase are parallel. *Note:* Homogeneous plane waves are sometimes called uniform plane waves. (AP/PROP) 211-1997

homogeneous series (of current-limiting fuse units) A series of fuse units, deviating from each other only in such characteristics that, for a given test, the testing of one or a reduced number of particular fuse units of the series may be taken as representative of all the fuse units of the series. (SWG/PE) C37.100-1992, C37.40-1993

homojunction (fiber optics) A junction between semiconductors that differ in their doping level conductivities but not in their atomic or alloy compositions. *See also:* heterojunction. (Std100) 812-1984w

homopolar generator A dc generator in which the magnetic field flux passes in the same direction from one member to the other over the whole of a single air gap area. Characteristically the machines are high-current, low-voltage generators. (IA/MT) 45-1998

homopolar machine* **(rotating machinery)** A machine in which the magnetic flux passes in the same direction from one member to the other over the whole of a single air-gap area. Preferred term is acyclic machine. (PE) [9]

* Deprecated.

honeycomb coil A coil in which the turns are wound in crisscross fashion to form a self-supporting structure or to reduce distributed capacitance. *Synonym:* duolater coil. (PE/EM) 43-1974s

hood *See:* insulator cover.

hook, conductor lifting A device resembling an open boxing glove designed to permit the lifting of conductors from a position above them. It is normally used during clipping-in operations. Suspension clamps are sometimes used for this purpose. *Synonyms:* lip; lifting shoe; boxing glove; conductor hook. (T&D/PE) 524-1992r

hook ladder *See:* tower ladder.

hook operation *See:* stick operation.

hook ring (air switch) A ring provided on the switch blade for operation of the switch with a switch stick. (SWG/PE) C37.100-1992

hook stick *See:* switch stick.

hopper *See:* card hopper.

horizontal amplifier (oscilloscopes) An amplifier for signals intended to produce horizontal deflection. *See also:* oscillograph. (IM/HFIM) [40]

horizontal bushing A bushing intended to be mounted horizontally at an angle 70° to 90° from the vertical. (PE/TR) C57.19.03-1996

horizontal component of the electric field strength The rms value of the component of the electric field strength in a horizontal plane passing through the point of measurement. (T&D/PE) 539-1990

horizontal deflection axis (oscilloscopes) The horizontal trace obtained when there is a horizontal deflection signal but no vertical deflection signal. (IM) 311-1970w

horizontal feed Pertaining to the motion of a punch card along a card feed path with the long edge first. *Contrast:* vertical feed. (C) 610.10-1994w

horizontal footcandles (HFC) Illuminance measured in a horizontal plane. (RL) C136.10-1996

horizontal hold control (television) A synchronizing control that adjusts the free-running period of the horizontal deflection oscillator. (BT/AV) 201-1979w

horizontally integrated microprocessor A microprocessor in which horizontal microinstructions can be performed. *Contrast:* vertically integrated microprocessor. (C) 610.10-1994w

horizontally polarized field vector A linearly polarized field vector whose direction is horizontal. (AP/ANT) 145-1993

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

horizontally polarized wave (1) (general) A linearly polarized wave whose direction of polarization is horizontal. *See also:* radiation. (EEC/PE) [119]

(2) A linearly polarized wave whose electric field vector is perpendicular to the plane of incidence or parallel to the Earth's surface in radio propagation. Same as S-polarization in optics; perpendicular polarization in physics. *See also:* transverse electric wave. (AP/PROP) 211-1997

horizontal machine A machine whose axis of rotation is approximately horizontal. (PE) [9]

horizontal microinstruction A microinstruction that specifies a set of simultaneous operations needed to carry out a given machine language instruction. *Contrast:* diagonal microinstruction; vertical microinstruction. (C) 610.10-1994w, 610.12-1990

horizontal plane (illuminating engineering) (of a searchlight) The plane that is perpendicular to the vertical plane through the axis of the searchlight drum and in which the train lies. (EEC/IE) [126]

horizontal tabulation (A) On an impact printer or a typewriter, movement of the imprint position a predetermined number of character spaces along the writing line. **(B)** On a display device, movement of the cursor a predetermined number of display positions along a display line. *Contrast:* vertical tabulation. (C) 610.10-1994

horizontal tabulation character (HT) A format effector character that causes the print or display position to move forward to the next of a series of predetermined positions along the same horizontal line. (C) 610.5-1990w

horizontal ring induction furnace A device for melting metal, comprising an annular horizontal placed open trough or melting channel, a primary inductor winding, and a magnetic core which links the melting channel with the primary winding. (IA) 54-1955w

horn (1) (acoustic practice) A tube of varying cross-sectional area for radiating or receiving acoustic waves. *Note:* Normally it has different terminal areas that provide a change of acoustic impedance and control of the directional response pattern. (SP) [32]

(2) An antenna consisting of a waveguide section in which the cross sectional area increases towards an open end that is the aperture. (AP/ANT) 145-1993

horn antenna (data transmission) A radiating element having the shape of a horn. (PE) 599-1985w

horn gap An air-gap metal electrode device, consisting of a straight vertical round electrode and an angularly shaped round electrode. In the case of a telephone pair, there is one common grounded central straight vertical electrode and two angular electrodes, one for each side of the pair. The gaps are usually adjustable. Horn gaps are used usually outdoors on open-wire lines exposed to high-voltage power transmission lines and in conjunction with isolating or drainage transformers. They are also frequently used alone out along the open-wire pair. They provide protection against both lightning and power contacts. (PE/PSC) 487-1992

horn-gap switch A switch provided with arcing horns. (SWG/PE) C37.36b-1990r, C37.100-1992

horn mouth Normally the opening, at the end of a horn, with larger cross-sectional area. (SP) [32]

horn reflector antenna (1) (communication satellite) A form of reflector antenna, where the energy coming from the throat of a horn is reflected by a segment of a paraboloid. This type of antenna has a very low backlobe. *See also:* Cassegrainian feed. (COM) [24]

(2) An antenna consisting of a portion of a paraboloidal reflector fed with an offset horn that physically intersects the reflector, part of the wall of the horn being removed to form the antenna aperture. *Note:* The horn is usually either pyramidal or conical, with an axis perpendicular to that of the paraboloid. (AP/ANT) 145-1993

horn throat (audio and electroacoustics) Normally the opening, at the end of a horn, with the smaller cross-sectional area. (SP) [32]

horsepower rating, basis for single-phase motor A system of rating for single-phase motors, whereby horsepower values are determined, for various synchronous speeds, from the minimum value of breakdown torque that the motor design will provide. (PE) [9]

hose (1) (liquid cooling) (rotating machinery) The flexible insulated or insulating hydraulic connections applied between the conductors and either a central manifold or coolant passage. (PE) [9]

(2) *See also:* conductor cover. (PE/T&D) 516-1987s

hose clamp *See:* strand restraining clamp.

hoseproof *See:* waterproof machine.

hospital (health care facilities) A building or part thereof used for the medical, psychiatric, obstetrical or surgical care, on a 24-hour basis, of 4 or more inpatients. Hospital, wherever used in this Code, shall include general hospitals, mental hospitals, tuberculosis hospitals, children's hospitals, and any such facilities providing inpatient care. (NESC/NEC) [86]

hospital information system (HIS) An automated system used in hospitals and other health care facilities to perform such tasks as communication between staff members, statistical analysis, inventory planning, and scheduling of medication, blood analysis, and patient testing. *Note:* Hospital information systems typically use interactive operations on a hierarchical file structure based on a patient-oriented record. *Synonyms:* medical information system; health information system. (C) 610.2-1987

Hospital Operating System-Structured Programming Language An application-oriented language with some FORTRAN features, used to manipulate string variables and to support structured programming. (C) 610.13-1993w

host (1) A device to which other devices (peripherals) are connected and that generally controls those devices. (EMC/EMB/MIB) C63.4-1991, 1073.3.1-1994

(2) A device, typically a personal computer, that will control the communications with attached peripherals. (C/MM) 1284-1994

(3) In general, an electronic circuit assembly (e.g., a plug-in unit, a back-plane, a mother board, or another mezzanine card), that provides electrical and/or mechanical connections to a subordinate assembly. (C/BA) 1301.4-1996

(4) Whatever is driving (i.e., providing) commands or data to the printer (e.g., a workstation, a print server, or spooler.) (C/MM) 1284.1-1997

(5) The client or host station/computer, with which the RTU equipment communicates. *Synonym:* master. (PE/SUB) 1379-1997

(6) *See also:* host computer. (C/DIS) 610.7-1995, 1278.2-1995

host byte order The native representation of an integer: unsigned integer m is the representation in *host byte order* of bit string $b_n\ b_{n-1}. \ . \ . b_0$ (where b_n is the *most significant*, or *highest order* bit, and b_0 is the *least significant* or *lowest order* bit) if $m = 2^n * b_n + 2^{n-1} * b_{n-1} + \ . \ . \ . \ + 2^0 * b_0$. (C) 1003.5-1999

host character string A sequence of characters describing a host. Within software definition files of an exported catalog, all data that can be encoded using IRV, shall be. Any such data that cannot be so encoded shall be transformed using UTF-8. (C/PA) 1387.2-1995

host computer (1) A computer, attached to a network, providing primary services such as computation, data base access or special programs or programming languages. *See also:* communications computer. (LM/COM/EMB/MIB) 168-1956w, 1073.3.1-1994

(2) A computer that supports one or more simulation applications. All host computers participating in a simulation exercise are connected by network(s) including local area networks, wide area networks, radio frequency links, etc. (DIS/C) 1278.1-1995, 1278.2-1995r

(3) (A) The primary or controlling computer in a multiple computer installation. *Synonyms:* host machine; host. *See also:* bifunctional machine. **(B)** The primary or controlling processor in a multiprocessor computer or a computer with multiple processing elements, some of which may be dedicated to specific functions. For example, intelligent adapters; math coprocessors. *Synonym:* host processor. (C) 610.7-1995, 610.10-1994

(4) A computer used to prepare computer programs for use on another computer or on another computer system; for example, a computer used to compile, link, or test programs to be used on another system. *Synonym:* host processor. (C) 610.10-1994w

host computer system A computational-based system used for clinical support of patient care, limited to medical device data interchange. *Synonym:* patient care information system. (EMB/MIB) 1073.4.1-2000

hostile environment computer A computer designed for use in an environment not conducive to safe operation, such as one with many dust particles in the air; precautions must be taken to ensure that dust particles do not enter the disk drives or settle on the heads. *See also:* hardened computer. (C) 610.10-1994w

host interface The interface between a communications network and a host computer. (C) 610.7-1995, 610.10-1994w

host language A programming language such as COBOL or PL/I into which data manipulation language statements are embedded. *See also:* data sublanguage. (C) 610.5-1990w

host machine (1) (A) (software) A computer used to develop software intended for another computer. *Contrast:* target machine. **(B) (software)** A computer used to emulate another computer. *Contrast:* target machine. **(C) (software)** The computer on which a program or file is installed. **(D) (software)** In a computer network, a computer that provides processing capabilities to users of the network. (C) 610.12-1990

(2) *See also:* host computer. (C) 610.7-1995

host processor (1) (FASTBUS acquisition and control) The data processing and control processor assigned to exercise overall supervision over a FASTBUS system. Contains detailed knowledge of the system topology. (NID) 960-1993

(2) A processor that controls all or part of a user application network. *See also:* host computer. (C) 610.10-1994w

hot *See:* energized.

hot cathode (thermionic cathode) A cathode that functions primarily by the process of thermionic emission. (ED) 161-1971w

hot-cathode lamp (illuminating engineering) An electric-discharge lamp whose mode of operation is that of an arc discharge. The cathodes may be heated by the discharge or by external means. (EEC/IE) [126]

hot-cathode tube (thermionic tube) An electron tube containing a hot cathode. (ED) 161-1971w, [45]

hot electron programming The injection of energetic "hot" electrons onto the floating gate. (ED) 1005-1998

hot-end termination (electrical heat tracing for industrial applications) The termination applied to the end of a heating cable, opposite where the power is supplied. (BT/AV) 152-1953s

hot-line protectors *See:* open-wire protectors.

hot plate (including portable) An appliance fitted with heating elements and arranged to support a flat-bottomed utensil containing the material to be heated. (PE/EEC) [119]

hot reserve The thermal reserve generating capacity maintained at a temperature and in a condition to permit it to be placed into service promptly. *See also:* generating station. (T&D/PE) [10]

hot-spot A non-recommended abbreviated term frequently used as a synonym for the maximum or hot-test-spot temperature rise of a winding. (PE/TR) C57.134-2000

hot stick *See:* stick.

hot swap (1) The act of connecting or disconnecting a Smart Transducer Interface Module and a Network Capable Application Processor without first turning off the power that the Network Capable Application Processor supplies to the Smart Transducer Interface Module over the Transducer Independent Interface. (IM/ST) 1451.2-1997

(2) A disconnection of a subcomponent and a reconnection of the same or a replacement component without first turning off the power at the connection interface. (IM/ST) 1451.1-1999

hottest-spot differential temperature The temperature difference between the hottest spot of the conductors in contact with insulation and the average winding temperature. (PE/TR) 1276-1997

hottest-spot temperature (1) (electric equipment) (thermal classification of electric equipment and electrical insulation) The highest temperature attained in any part of the insulation of electric equipment. (Difficulties in its determination are encountered. See IEEE Std 1-1986, Section 4). (EI) 1-1986r

(2) (power and distribution transformers) The highest temperature inside the transformer winding. It is greater than the measured average temperature (using the resistance change method) of the coil conductors. (PE/TR) C57.12.80-1978r

hottest-spot temperature allowance (1) (thermal classification of electric equipment and electrical insulation) (electrical equipment) The designated difference between the hottest-spot temperature and the observable insulation temperature. (The value is arbitrary, difficult to determine, and depends on many factors, such as size and design of the equipment). (EI) 1-1986r

(2) (equipment rating) A conventional value selected to approximate the degrees of temperature by which the limiting insulation temperature rise exceeds the limiting observable temperature rise. (Std100) [83]

hot-wire instrument An electrothermic instrument that depends for its operation on the expansion by heat of a wire carrying a current. *See also:* instrument. (EEC/PE) [119]

hot-wire microphone A microphone that depends for its operation on the change in resistance of a hot wire produced by the cooling or heating effects of a sound wave. *See also:* microphone. (EEC/PE) [119]

hot-wire relay A relay in which the operating current flows directly through a tension member whose thermal expansion actuates the relay. *See also:* relay. (EEC/REE) [87]

hot zone In text formatting, a predefined region at the right end of each line of text, having the characteristic that any word that begins in the region and extends beyond it is automatically moved to the next line, and any word that begins before the region and extends beyond it must be hyphenated. *Synonyms:* line-end zone; line-ending zone; margin-adjust zone. (C) 610.2-1987

hot zone hyphenation In text formatting, semi-manual hyphenation in which any word that extends beyond the hot zone must be either hyphenated or moved to the next line. (C) 610.2-1987

Houlding measurement (nonlinear, active, and nonreciprocal waveguide components) A method used in the determination of a varactor diode figure of merit (cutoff frequency). The measurement involves matching the device under test at a fixed bias level in a tunable cavity and interpreting the reflection coefficient data when the bias level is changed. (MTT) 457-1982w

hour Sixty contiguous minutes starting at a clock hour or half-hour. *See also:* time-consistent traffic measures. (COM/TA) 973-1990w

hour rate (1) The discharge rate of a battery expressed in terms of the length of time a fully-charged battery can be discharged at a specific current before reaching a specified end-of-discharge voltage:

Hour rate $= C/I$

where C = rated capacity of the battery at the specified discharge current I. For example, if a fully-charged battery rated at 100 Ah can be discharged at 5 A for a period of 20 h before reaching the end-of-discharge voltage, discharge of the battery at 5 A is referred to as the 20 h rate (C/I = 100 Ah/5A). (PV) 1013-1990

(2) The discharge rate of a battery expressed in terms of the length of time a fully charged battery can be discharged at a specific current before reaching a specified end-of-discharge voltage: hour rate $= C/I$, where C = rated capacity of the battery at the specified discharge current I. (PV) 1144-1996

house cable (communication practice) A distribution cable within the confines of a single building or a series of related buildings but excluding cable run from the point of entrance to a cross-connecting box, terminal frame, or point of connection to a block cable. *See also:* cable. (PE/EEC) [119]

housekeeping operation A computer operation that establishes or reestablishes a set of initial conditions to facilitate the execution of a computer program; for example, initializing storage areas, clearing flags, rewinding tapes, opening and closing files. *Synonym:* overhead operation. (C) 610.12-1990

house turbine A turbine installed to provide a source of auxiliary power. *See also:* generating station. (PE/T&D) [10]

housing (1) (rotating machinery) Enclosing structure, used to confine the internal flow of air or to protect a machine from dirt and other harmful material. (PE) [9]

(2) (power cable joints) A metallic or other enclosure for the insulated splice. (PE/IC) 404-1986s

(3) (of an oil cutout) A part of the fuse support that contains the oil and provides means for mounting the fuse carrier, entrance terminals, and fixed contacts. The housing includes the means for mounting the cutout on a supporting structure and openings for attaching accessories such as a vent or an expansion chamber. *Synonym:* body. (SWG/PE) C37.100-1992, C37.40-1993

HPCL *See:* Hewlett-Packard Printer Control Language.

HPGe *See:* high-purity germanium.

HPGL *See:* Hewlett-Packard Graphics Language.

H-plane, principal For a linearly polarized antenna, the plane containing the magnetic field vector and the direction of maximum radiation. (AP/ANT) 145-1993

H-plane tee junction (shunt tee) (waveguide components) A waveguide tee junction in which the magnetic field vectors of the dominant mode in all arms are parallel to the plane containing the longitudinal axes of the arms. (MTT) 147-1979w

HPPCL *See:* Hewlett-Packard Printer Control Language.

HRAM *See:* hierarchical random-access memory.

HRC *See:* high rupturing capacity.

HSAM *See:* hierarchical sequential access method.

H-scope A cathode-ray oscilloscope arranged to present an H-display. (AES/RS) 686-1990

HSP *See:* high-speed printer.

HT *See:* horizontal tabulation character.

hub (1) (broadband local area networks) A central location of a network that connects network nodes through spokes. Similar to a headend for bi-directional networks except that it more often associated with a star architecture. A hub is usually a site that is responsible for providing services to headends located at remote sights. Microwaves or other communication methods may be used to connect the hub to a headend. (LM/C) 802.7-1989r

(2) A reference point established through a land survey. A hub or point on tangent (POT) is a reference point for use during construction of a line. The number of such points that are established will vary with the job requirements. Monuments, however, are usually associated with state or federal surveys and are intended to be permanent reference points. Any of these points may be used as a reference point for transit sagging operations, provided that all necessary data pertaining to them is known. It is quite common to establish additional temporary hubs as required for this purpose. *Synonyms:* monument; point on tangent. (T&D/PE) 524-1992r

(3) (A) A device to which multiple LAN station lobes are connected. *Note:* Multiple hubs may be interconnected to create a single LAN. In some circumstances the hub may implement a part of the LAN protocols. *See also:* gateway; bridge; router. **(B)** A socket on a control panel or plugboard into which an electrical lead or plug wire may be connected in order to carry signals—particularly to distribute the signals over many other wires. (C) 610.7-1995

(4) A device used to provide connectivity between DTEs. Hubs perform the basic functions of restoring signal amplitude and timing, collision detection, and notification and signal broadcast to lower-level hubs and DTEs. (LM/C) 802.3-1998, 610.7-1995

hue (1) (television) The attribute of visual sensation designated by blue, green, yellow, red, purple, etc. *Note:* This attribute is the psychosensorial correlate (or nearly so) of the colorimetric quantity dominant wavelength. (BT/AV) 201-1979w

(2) (illuminating engineering) (of a perceived color) The attribute which determines whether it is red, yellow, green, blue, or the like. (EEC/IE) [126]

hum A component of transmission-line audible noise consisting of pure tones of the power frequency and its harmonics. *Note:* For ac transmission lines, this is caused by ion motion in the air surrounding the conductors. (PE/T&D) 539-1990

human action The observable result (often a bodily movement) of a person's intention. (PE/NP) 1082-1997

human-centered simulation (human-centred simulation) A simulation carried out by people; for example, a simulation in which a human participant operates a mock-up of an instrument to establish a good ergonomic design of the instrument console. *Contrast:* computer-based simulation. *See also:* human-machine simulation. (C) 610.3-1989w

human/computer interface (HCI) The boundary across which physical interaction between a human being and the application platform takes place. (C/PA) 14252-1996

human factors engineering An interdisciplinary science and technology concerned with the process of designing for human use. (PE/NP) 1023-1988r

human interaction A human action or set of actions that affects equipment, response of systems, or other human actions. (PE/NP) 1082-1997

human interface *See:* user interface.

human-machine interface (HMI) Includes keyboards, displays, keypads, touch screens, and similar devices to allow human interaction with a system. (IM/ST) 1451.1-1999

human-machine simulation A simulation carried out by both human participants and computers, typically with the human participants asked to make decisions and a computer performing processing based on those decisions; for example, a simulation in which humans make automotive design decisions and a computer determines and displays the results of those decisions. (C) 610.3-1989w

human presentation system One system within the AI-ESTATE architectural concept. This system supports all users by providing a user interface for data entry and display to an AI-ESTATE implementation and knowledge acquisition support. (ATLAS) 1232-1995

human-system interface (HSI) The interaction between workers and their equipment. This interaction requires information to flow in two directions. The system provides status information to the user, and the user provides control information to the system. (PE/NP) 845-1999

human systems engineering The activities involved throughout the system life cycle that addresses the human element of system design (including usability, measures of effectiveness, measures of performance, and total ownership cost). These activities include the definition and synthesis of manpower, personnel, training, human engineering, health hazards, and safety issues. (C/SE) 1220-1998

human/touch ESD The ESD that occurs directly from a human fingertip, without the presence of any metallic structure in the ESD path. (EMC) C63.16-1993

humidity Water vapor within a given space. (IA/PSE) 241-1990r

humidity, relative The ratio of the mole fraction of water vapor that is present in the air to the mole fraction of water vapor that is present in saturated air. (IA/PSE) 241-1990r

hum sidebands (spectrum analyzer) Undesired responses created within the spectrum analyzer, appearing on the display, that are separated from the desired response by the fundamental or harmonics of the power line frequency. (IM) 748-1979w

hum test Measures low-frequency shield effectiveness against electric field coupling (dc to 100 kHz). (PE/IC) 1143-1994r

hunt group A series of telephone numbers in sequence that allows a calling party to connect with the first available line. (C) 610.7-1995

Huygen's principle Principle proposed by Christian Huygen in 1678 that states that:

— Each point on the wavefront of a light disturbance can be considered to be a new source of secondary spherical waves, and
— The wavefront at any other point in space can be found by constructing the envelopes of the secondary wavelets.

(AP/PROP) 211-1997

Huygens' source radiator An elementary radiator having the radiation properties of an infinitesimal area of a propagating electromagnetic wavefront. (AP/ANT) 145-1993

Huygens' sources Electric and magnetic sources that, if properly distributed on a closed surface S in substitution for the actual sources inside S, will ensure the result that the electromagnetic field at all points outside S is unchanged. *Synonym:* equivalent sources. (AP/ANT) 145-1993

HVdc converter station filter system (high-voltage direct-current systems) The harmonic filter system is designed to suppress, at their source, one or more predominant harmonic frequency currents and voltages which appear on the ac and dc transmission lines because of the ac-dc and dc-ac conversion processes. Harmonic filter system components consist of resistors and reactors (capacitive and inductive) of fixed or variable (controlled) values which make up discrete tuned filters (band-pass-to-ground) designed to limit the magnitude of a specific harmonic current and voltage, or high-pass (broad-band-to-ground) filters which can be effective over a wide frequency range. Carrier frequency noise can be caused by high-frequency current oscillations occurring during solid-state or mercury arc valve commutation. One method of noise suppression is by placing series inductors in the ac supply to the conversion equipment. In addition, precautions should be taken to minimize coupling though the interwinding capacitance of the converter transformers and also through the dc

neutral circuit. Methods of reducing power system influence levels in this range (5 k Hz and above) need to be carefully analyzed at the design state to provide adequate filtering in order that the interference to carrier frequency communications systems can be avoided. A high-pass (broad-band-to-ground) filter is used to suppress harmonics over a wide frequency range. It consists of a parallel RL network in series with a capacitor and is not sharply tuned. It can be designed to be effective above any of the harmonics from about the 11th to the 20th harmonic, and can also serve to suppress carrier frequency noise. A discrete frequency (band-pass-to-ground) filter can be tuned to one or more specific lower order harmonics up to the 17th or 18th harmonic (that is, odd multiples of a fundamental on the ac bus, and even multiples on the dc side). On the dc side, series smoothing reactors and surge capacitors should be considered, in addition to band-pass and high-pass filters, as means of suppressing harmonics. (COM/TA) 368-1977w

HVdc converter station noise (high-voltage direct-current systems) The processes of rectification and inversion create undesirable harmonic voltages and currents on both the ac and dc portions of the power system. Audio-frequency harmonics are low-order multiples of the fundamental ac frequencies which exist at the HVdc converter station line terminals. The audio-frequency range of major concern is up to approximately 5 kHz. The voltage and current wave distortion which result from the ac-dc conversion process produce frequencies in the carrier range of approximately 5 to 100 kHz and above. Currents at these frequencies appear on the ac or dc, or both, systems at excessive levels if they are unfiltered or inadequately reduced by other means at the converter terminals. Harmonic and carrier frequency currents can propagate for up to 160 km (99.4 mi) or more on transmission lines. The actual distance of propagation varies and is dependent on the frequency, wavelength, and attenuation by the power system impedance. The order of characteristic voltage harmonics found on a dc transmission line is given by KP, and the order of characteristic current harmonics found on the ac lines at the HVdc line terminals is given by KP $\pm$ 1, where K, the rectifier phase number, is the total number of rectifier conduction pulses per cycle based on the ac system frequency, and P = 1, 2, 3,..., any positive integer. The predominant audio- frequency range harmonics and carrier range frequencies, if unfiltered or improperly filtered, will tend to create undesirable longitudinal voltages in communications circuits located in proximity to the HVdc line or associated ac lines, by means of electromagnetic or elctrostatic, or both (also dc ionic drift) coupling. Filters for these noise sources are usually installed at the converter station, but because of design limitations, may not be completely effective. These longitudinally induced harmonics can, if sufficient in amplitude, be manifested as audible noise in communications systems because they act on inherent communication circuit unbalances (the conversion of common-mode potentials to differential-mode potentials). Data transmission and pulse-type signals can also be adversely affected depending on the situation. (COM/TA) 368-1977w

HVdc transmission facility (high-voltage direct-current systems) A Facility consisting of converters located at terminal stations connected by a transmission line, bus, or cable systems, which operate at elevated potentials and currents, and transmit electrical energy between ac systems. The converters. when functioning as a rectifier, change alternating current to direct (unidirectional) current; the transmission line transfers the power between terminal stations where the converters, functioning as an inverter, change the direct current back into alternating current. HVdc transmission facilities can also serve as asynchronous ties between ac systems. (COM/TA) 368-1977w

H.V. power flow control reactor A transmission class reactor connected in series with the transmission system in order to optimize power flow by altering the line reactance. (PE/TR) C57.16-1996

HWCI *See:* hardware configuration item.

hybrid balance (data transmission) A measure of the degree of balance between two impedances connected to two conjugate sides of a hybrid set, and is given by the formula for return loss. (PE) 599-1985w

hybrid circuit (A) A circuit, usually in the form of a module or substrate, that is made up of discrete components and integrated circuits. *Contrast:* monolithic integrated circuit. **(B)** A circuit that uses a combination of digital and analog components, modes of operation, or techniques. (C) 610.10-1994

hybrid coil (bridge transformer) (data transmission) A single transformer having effectively three windings, which is designed to be connected to four branches of a circuit so as to render these branches conjugate in pairs. (PE) 599-1985w

hybrid computer (1) (analog computer) A computer which consists of two main computers, one a dc analog computer, and the other a digital computer, with appropriate control and signal interface, such that they may simultaneously operate or solve, or both, upon different portions of a single problem. (C) 165-1977w

(2) A computer consisting of both a DC analog computer and a digital computer that can process both analog and digital data. (C) 610.10-1994w

hybrid coupling A type of coupling in which different subsets of the range of values that a data item can assume are used for different and unrelated purposes in different software module. *Contrast:* pathological coupling; data coupling; common-environment coupling; content coupling; control coupling. (C) 610.12-1990

hybrid device A VMEbus compatible device that includes application-specific subsets of VXIbus protocols. (C/MM) 1155-1992

hybrid high-temperature insulation system An insulation system usually composed of high-temperature solid insulation material adjacent to winding conductors and cellulose materials in the areas where the maximum temperature at rated load does not exceed 120°C. This system typically uses conventional mineral oil as the insulating liquid. (PE/TR) 1276-1997

hybrid junction (waveguide components) A waveguide or transmission-line arrangement with four ports which, when the ports have reflectionless terminations, has the property that energy entering ay one port is transferred (usually equally) to two of the remaining three. (MTT) 147-1979w

hybrid mode (1) (fiber optics) A mode possessing components of both electric and magnetic field vectors in the direction of propagation. *Note:* Such modes correspond to skew (non-meridional) rays. *See also:* skew ray; mode; transverse electric mode; transverse magnetic mode. (Std100) 812-1984w

(2) (waveguide) A waveguide mode such that both the electric and magnetic field vectors have components in the direction of propagation of the mode as well as transverse components. (MTT) 146-1980w

hybrid-mode horn (antenna) A horn antenna excited by one or more hybrid waveguide modes in order to produce a specified aperture illumination. (AP/ANT) 145-1993

hybrid network A local area network or wide area network that contains a mixture of topologies and access methods. (C) 610.7-1995

hybrid scheme A relay scheme (usually a pilot scheme) combining the logic of two or more conventional schemes. (PE/PSR) C37.113-1999

hybrid set (data transmission) Two or more transformers interconnected to form a network having four pairs of accessible terminals to which may be connected four impedances so that the branches containing them may be made conjugate in pairs when the impedances have the proper values but not otherwise. (PE) 599-1985w

hybrid simulation A simulation, portions of which are designed to be executed on an analog system and portions on a digital system. Interaction between the two portions may take place

during execution. *See also:* analog simulation; digital simulation. (C) 610.3-1989w

hybrid tee (waveguide components) (magic tee) A hybrid junction composed of an E-H tee with internal matching elements, which is reflectionless for a wave propagating into the junction from one pot when the other three ports have reflectionless terminations. (MTT) 147-1979w

hybrid wave (radio-wave propagation) An electromagnetic wave in which either the electric or magnetic field vector is linearly polarized normal to the plane of propagation and the other vector is elliptically polarized in this plane. *See also:* transverse-magnetic hybrid wave; transverse-electric hybrid wave. (AP) 211-1977s

hydraulically-release-free (trip-free) (as applied to a hydraulically operated switching device) A term indicating that by hydraulic control the switching device is free to open at any position in the closing stroke if the release is energized. *Note:* This release-free feature is operative even though the closing control switch is held closed. (SWG/PE) C37.100-1992

hydraulic operation Power operation by movement of a liquid under pressure. (SWG/PE) C37.100-1992

hydraulic pressure supply system The pumps, means for driving them, pressure and sump tanks, valves and piping connecting the various parts of the governing system, and associated and accessory devices. (PE/EDPG) 125-1988r

hydro capability (power operations) The capability supplied by hydroelectric sources under specified water conditions. (PE/PSE) 858-1987s

hydroelectric station (power operations) An electric generating station utilizing hydroenergy for the motive force of its prime movers. (PE/PSE) 858-1987s

hydrolysis (composite insulators) The chemical reaction between the ions of water and polymer materials resulting in depolymerization and a change of electrical and mechanical properties. (PE/T&D) 987-1985w

hydromagnetic wave* *See:* magneto-hydrodynamic wave.

* Deprecated.

hydro-thermal coordination Coordinated operation of hydroelectric, pumped-storage hydro, and steam electric stations so as to obtain minimum costs for the system over a predetermined period. (PE/PSE) 858-1993w

hyperabrupt junction (nonlinear, active, and nonreciprocal waveguide components) (semiconductor) A specially designed p-n junction that provides a greater capacitance change over a given voltage range than does an abrupt junction. These devices offer a linear frequency versus voltage characteristic over a limited voltage range when used in a voltage controlled oscillator. The slope of a log-log plot of abrupt-junction capacitance versus voltage is 0.5, whereas a hyperabrupt junction has a slope between 0.5 and 2.0 in the hyperabrupt voltage region. (MTT) 457-1982w

hypercube architecture A computer architecture in which processors are arranged as nodes in multiple dimensions with direct channel communication among neighboring nodes. *Note:* An n-dimensional hypercube has 2^n nodes. (C) 610.10-1994w

hypermedia The integration of text, graphics, sound, or video into an associative, user-controllable system of information storage and retrieval; for example, a hypermedia presentation on exercise might include dynamic links to additional topics such as health, anatomy, and sporting events. *Note:* If the information is primarily presented in text form, the product is known as hypertext. *See also:* multimedia. (C) 610.10-1994w

hypertape drive A high-speed tape drive that uses tape cartridges that can be automatically loaded. (C) 610.10-1994w

hypertext *See:* hypermedia.

hyphenation In text formatting, a manual, semi-manual, or fully automatic process of selecting appropriate word breaks at the end of a line of text and inserting a hyphen at one of those breaks. *Contrast:* hyphenless justification. *See also:* automatic hyphenation; semi-manual hyphenation; manual hyphenation. (C) 610.2-1987

hyphen drop In word processing, the automatic omission of a discretionary hyphen from formatted text when the hyphen is not needed to achieve justification. (C) 610.2-1987

hyphenless justification In text formatting, justification in which any word that will not fit entirely on one line is moved to the next line, and intercharacter or interword spacing is used to justify the text. *Contrast:* hyphenation. (C) 610.2-1987

hypothesis (overhead power lines) Statement of a concept that attempts to explain or predict some phenomenon in such a way that the hypothesis is testable. (T&D/PE) 539-1990

hysteresis The maximum difference in values for a digitizer code transition level when the transition level is approached from either side of the transition. (IM/WM&A) 1057-1994w

hysteresis coupling (1) (electric coupling) An electric coupling in which torque is transmitted by forces arising from the resistance to reorientation of established magnetic fields within a ferromagnetic material. (EM/PE) 290-1980w **(2)** An electric coupling in which torque is transmitted from the driving to the driven member by magnetic forces arising from the resistance to reorientation of established magnetic flux fields within ferromagnetic material usually of high coercivity. *Note:* The magnetic flux field is normally produced by current in the excitation winding, provided by an external source. (PE) [9]

hysteresis error (accelerometer) (gyros) The maximum separation due to hysteresis between up-scale-going and down-scale-going indications of the measured variable (during a full-range traverse, unless otherwise specified) after transients have decayed. It is generally expressed as an equivalent input. (AES/GYAC) 528-1994

hysteresis loss (power and distribution transformers) (magnetic) The energy loss in magnetic material that results from an alternating magnetic field as the elementary magnets within the material seek to align themselves with the reversing magnetic field. (PE/TR) C57.12.80-1978r

Hz *See:* hertz.