

WILEY ELECTRICAL AND ELECTRONICS ENGINEERING DICTIONARY

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anonymous remailer On the Internet, an email service that enables users to send messages to others without the recipients knowing the return address.

ANSI Acronym for American National Standards Institute. An organization involved in the facilitation of development of technical standards. Its main objectives include minimizing incompatibility problems on a global basis in order to promote the advancement of technology. It is a member of the International Organization for Standardization and the International Electrotechnical Commission.

ANSI character set An ANSI-defined 8-bit character set that includes 256 characters. It incorporates many foreign characters, symbols, and special punctuation.

ANSI X12 An ANSI standard pertaining to EDI. Its abbreviation is X12.

answer-back A response that a computer gives when requested to identify itself within a network.

answer-only modem A modem which can answer incoming calls, but cannot originate any.

answering machine A device which automatically answers calls, plays a message, and records messages left by callers. Such a device may be incorporated into a telephone, into a similar device, such as a properly equipped fax or computer, and so on. Also called **telephone answering machine**.

antenna A device that radiates and/or receives radio waves. The same antenna can usually be used for both transmission and reception. There are many types of antennas, their selection depending on the uses and operating frequencies desired. Also known as **aerial**.

antenna-amplifier A device which incorporates an antenna and an amplifier. Used mostly for compact portable units. Its abbreviation is **antennafier**.

antenna amplifier An amplifying device or component which improves the signal-to-noise ratio of a receiving antenna. Such a component or device may be within the antenna, or nearby.

antenna aperture An opening through which radiated energy passes to or from an antenna.

antenna array An assembly of antenna elements with the proper dimensions, characteristics, and spacing, so as to maximize the intensity of radiation in the desired directions. Also called **array (2)**, or **array antenna**.

antenna beamwidth The angle between the points at which the intensity of an antenna is at half of its maximum value. It can be measured in the horizontal plane or the vertical plane. Also called **beamwidth of antenna**.

antenna coil A coil through which the antenna current passes.

antenna coincidence The circumstance where two directional antennas are pointing directly at each other.

antenna-converter A device which incorporates an antenna and a converter. Intended to extend the available reception frequencies. Its abbreviation is **antennaverter**.

antenna counterpoise One or more wires mounted close to the ground, but insulated from it, to form a low-impedance and high-capacitance path to said ground. This provides a radio-frequency ground for the antenna. Also called **counterpoise**.

antenna coupler A device, such as an RF transformer, utilized to match the impedance of a transmitter and/or receiver to an antenna, so as to provide maximum power transfer. This enables, for example, the use of a shorter antenna than would ordinarily be needed.

antenna crosstalk The unwanted transfer of power through space between antennas. It is equal to the ratio of the power received by one antenna, to the power radiated by the other. It is usually expressed in decibels.

antenna current 1. The RF current flowing into an antenna, measured with no modulation present. 2. The RF current flowing out of an antenna, measured with no modulation present.

antenna detector A device, which incorporates an antenna, that signals when being tracked by radar.

antenna diplexer A device which allows two transmitters to use the same antenna simultaneously or alternately. Used, for example, in TV broadcasting to transmit the audio and video content via the same antenna. Also called **diplexer**.

antenna directivity The gain of an antenna in relation to the direction it is pointed in. For example, an omnidirectional antenna has, within the same plane, a uniform radiation and reception pattern.

antenna duplexer A device which enables a single antenna to be used to transmit and receive simultaneously or alternately. Used, for example, in radars. Also called **duplexer**.

antenna effect In a loop antenna, an unbalancing of the directional properties due to interference from nearby objects. This can cause it to act partially as a small vertical antenna. Electrostatic shielding can help minimize this effect. Also called **height effect**.

antenna efficiency The ratio between the received energy and the radiated energy of an antenna. Usually expressed as a percentage. If there were no losses, the antenna efficiency would be 100%.

antenna element Within an antenna array, one of multiple radiators which contribute to its overall transmission and/or reception characteristics. Such an element may be driven, or parasitic. Also called **element (4)**.

antenna factor The ratio of an incident electric field to the voltage received at the antenna terminals. It is usually expressed in decibels.

antenna feed The transmission line, such as a coaxial cable, which carries signals between a transmitter and an antenna. Also called **antenna feeder**, **antenna transmission line**, **feed (5)**, or **feed line**.

antenna feed point The point in an antenna where the antenna feed is received. Also called **feed point (2)**.

antenna feed point impedance The impedance at an antenna feed point. Also called **feed point impedance**.

antenna feeder Same as **antenna feed**.

antenna field A group of antennas arranged in a manner so as to maximize the intensity of radiation in the desired directions.

antenna gain The effectiveness, generally expressed in decibels, of a directional antenna as compared to a given standard, such as a dipole or isotropic antenna. Its symbol is A. Also known as **gain (2)**.

antenna height 1. The height of an antenna above the terrain immediately surrounding its location. 2. The height of an antenna above the average level of the terrain within a given radius surrounding its location. Also called **antenna height above average terrain**, or **height above average terrain**.

antenna height above average terrain Same as **antenna height (2)**.

antenna lens An antenna that uses an arrangement of metal and/or dielectric objects as a lens to focus the radio waves. Also called **lens antenna**.

antenna loading The utilization of inductive and/or capacitive elements to increase the electrical length of an antenna, or otherwise alter its characteristics. Also called **loading (1)**.

antenna lobe Within an antenna pattern, a three-dimensional section in which radiation and/or reception is increased. Also called **lobe (1)**, or **directional lobe (1)**. When referring specifically to radiation, also known as **radiation lobe**.

far field 1. Same as **far-field region**. 2. The electromagnetic field further than a given distance from a source of electromagnetic radiation. 3. The sound field further than a certain distance to a sound source. May be, for instance, that extending beyond two wavelengths.

far-field diffraction pattern The diffraction pattern of a light source which is observed at an effectively infinite distance from the object diffracting it. The light source may be, for instance, the output of an optical fiber, or that of an LED. Also called **Fraunhofer diffraction pattern**.

far-field region The region in which the transmitted energy from an antenna behaves as if it were emanating from a point source in the vicinity of said antenna. Such a region usually begins at a distance of $2D^2/\lambda$ from the antenna, where D is the maximum overall dimension of said antenna, and λ is the wavelength considered. The region of space closer to the antenna than the far field is the **near-field region**. Also called **far field (1)**, **far region**, **far zone**, **Fraunhofer region**, or **radiation zone**.

far infrared Its abbreviation is **far IR**. 1. Pertaining to **far-infrared radiation**. 2. Same as **far-infrared radiation**.

far-infrared radiation Electromagnetic radiation in the infrared region which is furthest from visible light. It corresponds to wavelengths of approximately 10 to 1000 micrometers, though the defined interval varies. Also called **far infrared (2)**, or **long-wave infrared**.

far IR Abbreviation of **far infrared**.

far region Same as **far-field region**.

far ultraviolet Its abbreviation is **far UV**. 1. Pertaining to **far-ultraviolet radiation**. 2. Same as **far-ultraviolet radiation**.

far-ultraviolet radiation Electromagnetic radiation which is between near ultraviolet and extreme ultraviolet. It corresponds to wavelengths of approximately 200 to 300 nm, though the defined interval varies. Also called **far ultraviolet (2)**, or **long-wave ultraviolet**.

far UV Abbreviation of **far ultraviolet**.

far zone Same as **far-field region**.

farad The SI unit of capacitance. It is equivalent to the capacitance of a capacitor in which a charge of 1 coulomb increases the potential difference between its plates by 1 volt. In practicality, this unit is so large that it is more common to use microfarads or picofarads. Its symbol is **F**.

faraday Same as **Faraday constant**.

Faraday cage An enclosure which blocks the effects of an electric field, while allowing free passage to magnetic fields. A Faraday cage usually consists of a network of parallel wires which provides a low-resistance path to ground. Such a network, for instance, may be incorporated into special plastic bags, providing safer storage and handling of circuit boards en route to being installed. Such a bag does not have to be grounded. Also called **Faraday shield**, **Faraday shielding (1)**, **Faraday screen**, **Faraday electrostatic shield**, or **shielded room**.

Faraday constant Its symbol is **F**. A physical constant equal to approximately 9.64853×10^4 coulombs per mole. Its formula is: $F = N_A \cdot e$, where N_A is Avogadro's number, and e is the electron charge. It is equal to the electric charge carried by a mole of electrons, or by a mole of singly-charged ions. Also called **faraday**.

Faraday dark space In a glow-discharge tube, a dark space between the negative glow and the positive column.

Faraday effect The rotation of the plane of polarization of an electromagnetic wave as it passes through certain materials, when under the influence of a magnetic field parallel to the direction of propagation of said wave. Also called **Kundt effect**, or **magnetic rotation**.

Faraday electrostatic shield Same as **Faraday cage**.

Faraday rotation The rotation of the plane of polarization of an electromagnetic wave as a result of the **Faraday effect**.

Faraday screen Same as **Faraday cage**.

Faraday shield Same as **Faraday cage**.

Faraday shielding 1. Same as **Faraday cage**. 2. The use of a **Faraday cage**.

Faraday's law 1. Either of **Faraday's laws of electrolysis**. 2. Same as **Faraday's law of electromagnetic induction**.

Faraday's law of electromagnetic induction A law which states that the electromotive force induced in a conductor is proportional to the rate of change of magnetic flux through it. Also called **Faraday's law of induction**, or **law of induction**.

Faraday's law of induction Same as **Faraday's law of electromagnetic induction**.

Faraday's laws of electrolysis 1. A law stating that during electrolysis, the amount of a substance deposited onto an electrode or dissolved into solution is directly proportional to the current passed. 2. A law stating that the amount of a substance deposited onto an electrode or dissolved into solution is proportional to the equivalent weight of said substance.

faradic current An intermittent and nonsymmetrical AC, such as that produced by the secondary winding of an induction coil.

Farnsworth dissector tube Same as **Farnsworth image dissector**.

Farnsworth image dissector A camera tube in which the picture to be transmitted is focused upon a photosensitive surface from which electrons are emitted proportionally to the light of each part of the picture. These electrons are focused, in sequence, onto a controller electrode, which produces the output video signal. Also called **Farnsworth dissector tube**, **image dissector**, or **dissector tube**.

fast-access storage For a given computer system, the storage from which data can be retrieved most rapidly.

Fast ATA An enhanced version of the IDE interface. It supports both the ATA-2 and ATAPI interfaces, providing for significantly faster transfer rates when using hard disks, optical discs, or tape drives. In addition, it supports hard disks with much larger capacities. Also called **Fast IDE**, **ATA-2**, or **EIDE**.

fast-blow fuse A fuse which opens a circuit at a lower amperage than a normal-blow fuse would. Used, for instance, to protect especially delicate components, circuits, stages, devices, units, equipment, or systems.

fast break The opening of an electric circuit without a delay. This contrasts with a **delayed break**, where there is a specified delay.

fast busy signal A busy signal that indicates that the central office either did not understand the dialed digits, or that a part of the network is too busy to process the call. This contrasts with a **slow busy signal**, which indicates that the dialed number is currently in use.

fast charge The accelerated charging of a rechargeable battery, such as a lithium-ion battery.

fast charger A battery charger used for **fast charges**. Such chargers usually maintain a trickle charge once the full charge is reached.

fast Ethernet An Ethernet standard supporting data transfer rates of up to 100 Mbps. Depending on the specific configuration, it may utilize two or four twisted-pair copper wires, or fiber-optic cables. Also called **100Base-T**.

fast-forward Its abbreviation is **FF**. 1. To advance a tape rapidly. For instance, than in a VHS cassette or digital audio tape cartridge. The term may also be used to refer to moving forward rapidly within the programming of an application.
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lead sulfate White crystals whose chemical formula is PbSO_4 . It is used in storage batteries.

lead sulfide Silver colored crystals or a black powder whose chemical formula is PbS . It is used in ceramics, infrared detectors, and in semiconductors. Lead sulfide is found chiefly in the mineral galena.

lead telluride Silver-gray crystals whose chemical formula is PbTe . It is used in photodetectors, and in semiconductors.

lead tetroxide Same as **lead oxide**.

lead wire Same as **lead (1)**.

lead zirconate titanate A ferroelectric ceramic which exhibits the piezoelectric effect. Used, for instance, as transducers, electro-optic devices such as electro-optic modulators, and as actuators in active control systems. Its abbreviation is **PZT**. The first letter of its abbreviation is taken from **Pb**, the chemical symbol for lead.

leaded ceramic chip carrier Same as **leaded chip carrier**. Its abbreviation is **LDCC**, or **LCCC**.

leaded chip carrier A ceramic package which has leads consisting of metal prongs or wires, as opposed to metallic contacts which are flush with the package or recessed, as is the case with **leadless chip carriers**. Its abbreviation is **LDC**, or **LCC**. Also called **leaded ceramic chip carrier**.

leader 1. A section of nonmagnetic tape, usually plastic, which is affixed to the beginning of a length of recording tape, such as a reel. A section attached at the end of a tape is called a **trailer (1)**. Also called **leader tape**. 2. In computers, a record which precedes and describes other records. 3. An initial discharge which sets the path for a subsequent lightning stroke. The leader ionizes the air along its trajectory, and such a discharge may occur between a cloud and the ground, between clouds, or within the same cloud. Also called **leader stroke**.

leader stroke Same as **leader (3)**.

leader tape Same as **leader (1)**.

leadframe 1. In a packaged chip, a metal frame which provides the leads for electrical connections. 2. In a packaged chip, a metal frame upon which leads may be mounted.

leading current An alternating current which leads the alternating voltage producing it. In a purely capacitive circuit this lead is 90° . This contrasts with a **lagging current**, where the voltage leads the current.

leading edge 1. The portion of a pulse waveform which first increases in amplitude. That is, the rising portion. The portion which first decreases is the **trailing edge (1)**. 2. The initial portion of a pulse or signal. The latter part is called **trailing edge (2)**.

leading load A load in which current leads voltage. The capacitive reactance exceeds the inductive reactance in such a load. This contrasts with a **lagging load**, where the voltage leads the current. Also called **capacitive load**.

leading zero A zero preceding the leftmost nonzero integer of a number. The presence or absence of leading zeroes does not change the value of a number, so zeroes preceding the leftmost nonzero integer, but which appear after a decimal point, are not leading zeroes. Leading zeroes may be used, for instance, to occupy blank spaces in a data field.

leading zero blanking Same as **leading zero suppression**.

leading zero suppression The blanking of any **leading zeroes**. Used, for instance, in some digital meters. Also called **leading zero blanking**.

leadless ceramic chip carrier Same as **leadless chip carrier**. Its abbreviation is **LCCC**.

leadless chip carrier A ceramic package which is hermetically sealed, and which instead of leads consisting of metal prongs or wires, has metallic contacts called castellations, which are flush with the package or recessed. The contacts

are usually on all four sides of the package, although they may be located elsewhere. Its abbreviation is **LCC**. Also called **leadless ceramic chip carrier**, or **ceramic leadless chip carrier**.

leaf 1. In a hierarchical structure, such as a tree, a node which has no descendants. In a hierarchical file system, for example, a file is a leaf. Also called **leaf node**, or **terminal node**. 2. A very thin sheet of metal. A leaf is thinner than a foil. A gold leaf may have a thickness of about 100 nanometers.

leaf electroscope An electroscope, especially a gold-leaf electroscope, in which one or two suspended metallic leaves serve to detect electric charges by means of electrostatic forces.

leaf node Same as **leaf (1)**.

leak 1. A flaw or fault which allows the undesired escape of something, such as a fluid or energy. Also, the location of such a flaw or fault. Also, that which escapes. May also refer to such a flaw or fault which allows the undesired entry of something. 2. The flow of current through unwanted paths of a circuit, along the surface or through the body of a dielectric or insulator, or that which is otherwise undesired or lost. Also, the current which flows in this manner, or is lost.

leak proof Constructed and/or arranged in a manner which does not allow **leakage**. Said, for instance, of an enclosure or apparatus. Also spelled **leakproof**. Also called **leak tight**.

leak tight Same as **leak proof**. Also spelled **leaktight**.

leakage 1. The usually undesired escape or entry of something, such as a fluid or energy, due to a **leak (1)**. 2. The undesired flow of **leakage current**.

leakage current Also called **current leakage**. 1. Current which flows through unwanted paths of a circuit, such as from the output to the input when not intended. 2. Current which flows between electrodes of an electron tube by any route except the interelectrode space. 3. Current which flows along the surface or through the body of a dielectric or insulator. 4. Direct current which flows through the dielectric of a capacitor. 5. Alternating current which flows through a rectifier without being rectified. 6. Current which flows through a component, circuit, or device which is in the off state. Also called **off-state leakage current**.

leakage detection The use of a **leakage detector**.

leakage detector An instrument or device which detects **leakage**. Such a detector may also quantify said leakage. Also called **leakage indicator**.

leakage flux Magnetic flux which does not pass through a useful or intended part of a magnetic circuit. Also called **flux leakage**.

leakage indicator Same as **leakage detector**.

leakage inductance Self-inductance, especially in a transformer, due to **leakage flux**.

leakage path The path followed by a **leakage current**. Also called **sneak path**.

leakage power Power which is dissipated in an undesired manner.

leakage radiation Radiation which escapes in an undesired manner. For example, electromagnetic radiation escaping through an unintended part of an antenna system, or X-rays emanating in an unwanted direction from an X-ray tube.

leakage reactance Inductive reactance, especially in a transformer, due to **leakage flux**.

leakage resistance Resistance along the path which **leakage current** flows. In a capacitor, for instance, this resistance is usually very high.

leakproof Same as **leak proof**.

leaktight Same as **leak proof**. Also spelled **leaktight**.
 WiTricity Corp.
 Exhibit 2006
 Page 4

magnetic character A character printed with **magnetic ink**.

magnetic character reader A device which scans magnetic characters, and utilizes magnetic character recognition to identify them.

magnetic character recognition The ability of a computer, or other device, to identify scanned magnetic characters, and to convert this information into a digital code suitable for further processing. An example is a magnetic-ink character recognition system utilized to identify bank checks.

magnetic circuit A closed path described by magnetic lines of force. A magnetic circuit is analogous to an electric circuit in that the magnetomotive force corresponds to the electromotive force, reluctance to resistance, and magnetic flux to electric current.

magnetic circuit breaker A circuit breaker which utilizes a magnetic field for opening a circuit under specified conditions. Such devices are especially useful, for instance, for accurate and reliable circuit protection when used over a wide temperature interval, which can be a problem with thermal circuit breakers.

magnetic coercive force The magnetic field which must be applied to a previously magnetized ferromagnetic material, in order to reduce to zero the residual magnetism of said material. Usually expressed in oersteds. Also called **coercive force**.

magnetic coercivity For a given ferromagnetic material, the ease or difficulty in it being magnetized or demagnetized. A material exhibiting low coercivity is easy to magnetize and demagnetize, while a material with high coercivity is hard to magnetize and demagnetize. Also called **coercivity**.

magnetic coil One or more conductors wound in a series of turns, so as to introduce inductance, or to produce a magnetic field in an electric circuit. A magnetic coil may be wound, for example, around a ferromagnetic core. Used, for instance, in transformers, electromagnets, solenoids, motors, loudspeakers, and so on. Also known as **magnet coil**, **coil**, **inductor**, **inductance** (3), **inductance coil**, or **electric coil**.

magnetic compass A magnetic instrument which indicates a horizontal reference direction. Such an instrument usually consists of one or more magnetic needles which freely turn on a pivot and point to magnetic north.

magnetic component In an electromagnetic wave, the magnetic constituent. It is perpendicular to the electric component. Also called **electromagnetic component**.

magnetic conductivity Same as **magnetic permeability**.

magnetic confinement The confinement of a plasma using magnetic fields. A magnetic bottle may be used for this purpose.

magnetic constant A physical constant equal to $4\pi \cdot 10^{-7}$ henry per meter, or approximately 1.256637×10^{-6} henry per meter. This number represents the absolute permeability of free space. The relative permeability of free space is 1. Its symbol is μ_0 . Also called **permeability of free space**.

magnetic contactor A contactor which is actuated via electromagnetic means.

magnetic control The control of a device, piece of equipment, system, or process through the use of electromagnetic components, such as magnetic contactors.

magnetic controller An automatic controller which utilizes magnetic control.

magnetic core 1. A magnetic material, such as iron, around which a magnetic coil is wound. Such a core may be used in a device such as an electromagnet or transformer, and increases the inductance of the coil. Also called **core** (3). 2. Same as **magnetic core memory**.

magnetic core memory A magnetic material, such as iron oxide, used as a bistable element, multiple units of which are configured in an array which may store data. It is a seldom-

used form of non-volatile computer memory. Also called **magnetic core** (2), **core** (4), **core storage** (1), or **core memory** (1).

magnetic coupling Coupling in which magnetic energy is transferred between components or circuits. An example is electromagnetic coupling.

magnetic cycle 1. The variations in the magnetic flux of a material or medium as the strength of an influencing magnetic field varies through a complete cycle. For example, the changes in the magnetization of a body as a magnetizing AC fluctuates. 2. A cyclical variation in which magnetic properties vary in a regular manner. For example, the 22 year solar magnetic cycle.

magnetic damping The use of one or more magnetic fields for damping. An example would be the use of electromagnetic induction to limit overshoot of the pointer of an instrument.

magnetic declination For a given geographic location, the angle representing the difference between magnetic north and true north. Also called **declination**.

magnetic deflection The use of one or more magnetic fields for deflecting particles or objects. An example is electrostatic deflection.

magnetic density For a given material, medium, or region, the magnetic lines of force per unit area of cross-section.

magnetic detector A device which detects magnetic materials. Such a detector can be used in robotics, for example, to locate materials of a specific composition. Also called **magnetic sensor**.

magnetic dip For a given location on the surface of the earth, the angle between the horizontal plane and the direction of the lines of force of the earth's magnetic field. Magnetic dip is 0° at the magnetic equator and 90° at each of the magnetic poles. Also called **magnetic inclination**, **inclination** (2), or **dip** (3).

magnetic dipole Two equal magnetic poles with opposite polarity separated by a very small distance. Two equal magnetic poles with opposite polarity separated by a very small distance. Also called **magnetic doublet**, **dipole** (2), or **doublet** (3).

magnetic dipole moment For a magnet placed in a magnetic field, the maximum torque experienced by the magnet divided by the magnitude of the magnetic field acting on said magnet. May be expressed in joules/tesla. Also called **magnetic dipole moment**, or **dipole moment** (2).

magnetic disc Same as **magnetic disk**.

magnetic disk A digital magnetic storage medium, which is usually in the form of a rotating round plate. Information is encoded by altering the magnetic polarity of minute portions on the surface of such a disk. Magnetic disks may be recorded, erased, and rerecorded many times, and the most common formats are hard disks, floppy disks, and removable hard disks. Also spelled **magnetic disc**. Also called **disk** (1).

magnetic displacement Same as **magnetic flux density**.

magnetic domain Within a ferromagnetic substance, a region in which the atomic or ionic magnetic moments are aligned in the same direction. Such a domain may be used, for instance, to store a bit as a 1 or a 0 on a magnetic tape or disk. Also called **ferromagnetic domain**, or **domain** (2).

magnetic doublet Two equal magnetic poles with opposite polarity separated by a very small distance. Also called **magnetic dipole**, **dipole** (2), or **doublet** (3).

magnetic drum An early type of data-storage device, which consisted of a cylinder coated with a magnetic material, and whose tracks each had their own read/write head. Also called **drum storage**, or **drum** (2).

NCP 1. Abbreviation of **network control program**. 2. Abbreviation of **network control protocol**.

NCSA Abbreviation of National Center for Supercomputer Applications. A center for high-performance computing and networking that provides supercomputer resources, and which develops applications, such as Mosaic.

NCSA server Abbreviation of National Center for Supercomputer Applications **server**. An HTTP server developed by the NCSA. It was one of the first tailored to the World Wide Web.

NCSA Telnet Abbreviation of National Center for Supercomputer Applications **Telnet**. A Telenet application developed and distributed by the NCSA.

Nd Chemical symbol for **neodymium**.

NDB Abbreviation of **non-directional radio beacon**.

NDMP Abbreviation of **Network Data Management Protocol**.

NDR Same as **non-destructive readout**.

NDRO Same as **non-destructive readout**.

Ne Chemical symbol for **neon**.

near-end crosstalk Crosstalk which is propagated between circuits in which the interfering signal travels in the direction opposite that of the desired signal. The terminal where near-end crosstalk is observed is usually near or at its origination point. This contrasts with **far-end crosstalk**, where each signal travels in the same direction, and is usually observed at a point distant from the where it originates. Its abbreviation is **NEXT**.

near field 1. Same as **near-field region**. 2. The electromagnetic field closer than a given distance from a source of electromagnetic radiation. 3. The sound field close to a sound source. May be, for instance, that within two wavelengths.

near-field recording A data-storage method combining features of magneto-optical recording and magnetic hard disk technologies, to create and utilize extremely narrow bit cells, which in turn provide enhanced capacity and performance. Its abbreviation is **NFR**.

near-field region For a transmitting antenna, the electromagnetic field extending no further than a distance of $2D^2/\lambda$, where D is the maximum overall dimension of said antenna, and λ is the wavelength considered. Beyond this distance, the **far-field region** begins. Also called **near field (1)**, **near region**, or **near zone**

near infrared Its abbreviation is **near IR**. 1. Pertaining to **near-infrared radiation**. 2. Same as **near-infrared radiation**.

near-infrared radiation Electromagnetic radiation in the infrared region which is nearest to visible light. It corresponds to wavelengths of approximately 0.75 to 3 micrometers, though the defined interval varies. Also called **near infrared (2)**.

near-instantaneous companded audio multiplex Same as **NICAM**.

near-instantaneously companded audio multiplex Same as **NICAM**.

near IR Abbreviation of **near infrared**.

near-letter quality Printed characters which are dark, crisp, and well-defined, but not to the extent exhibited in **letter quality**. Also, a printing mode with such an output. Most laser printers can print in this mode. Its abbreviation is **NLQ**.

near online Same as **nearline**.

near region Same as **near-field region**.

near ultraviolet Its abbreviation is **near UV**. 1. Pertaining to **near-ultraviolet radiation**. 2. Same as **near-ultraviolet radiation**.

near-ultraviolet radiation Electromagnetic radiation in the ultraviolet region which is nearest to visible light. It corresponds to wavelengths of approximately 300 to 400 nm, though the defined interval varies. Also called **near ultraviolet**, or **soft ultraviolet**.

near UV Abbreviation of **near ultraviolet**.

Near Video on Demand Cable or satellite programming, especially movies, offered at staggered times. For example, there may be a selection of 30 feature films, each of which starts again every 10 or 15 minutes. Its abbreviation is **NVOD**.

near zone Same as **near-field region**.

nearline Abbreviation of **near online**. Not quite immediately available or accessible. Said, for instance, of data archived in CD-Rs.

NEC Acronym for **National Electrical Code**.

necessary bandwidth For a given type or class of emission, the minimum frequency interval necessary to provide a specified level of quality at a stated transmission speed. Signals outside of this band may be suppressed to help ensure adequate performance.

needle 1. A slender and pointed object, or that resembling such an object. For instance, the shape of the magnetizable particles on the surface a magnetic tape or disk is that of a needle. 2. A **needle (1)** which serves to convey information in a meter, gauge, or similar device or instrument. A specific example is that used in a D'Arsonval galvanometer. Also called **needle pointer**, **indicator needle**, or **pointer needle**. 3. A pointed object which extends from a phonographic pickup, and which serves to follow the undulations of the grooves of a phonographic disc and transmit them as vibrations to said pickup. Such an object is usually made of a metal needle with a diamond or sapphire tip. Also called **stylus (3)**. 4. A needle in a magnetic compass. Also called **magnetic needle**.

needle electrode A slender and pointed electrode, such as that used in electrocautery.

needle pointer Same as **needle (2)**.

needle probe A probe with a slender and pointed tip, such as that used in electrocautery.

Néel temperature For a material exhibiting ferrimagnetism, the temperature below which its magnetic properties are similar to ferromagnetic materials. Above this temperature, such a material becomes paramagnetic.

neg Abbreviation of **negative**.

negation Same as **NOT**.

negative Its abbreviation is **neg**, or **N**. Its symbol is $-$. 1. Of, or pertaining to, a quantity or value below zero. For instance, a temperature below 0 °C, or a negative number. 2. Of, pertaining to, or the same as the charge or a multiple of the charge of an electron. For example, the minus one charge of a chlorine ion. 3. Of, or pertaining to, a particle, material, or other entity which has an excess of electrons. For instance, an anion. 4. Of, or pertaining to, a quantity, value, entity, phenomenon, or concept which is considered the opposite of an equivalent which would be described as positive. For example, a negative electrode, negative image, negative peak, negative pole, and so on. 5. Same as **negative image**.

negative acceleration Slowing down, or the rate at which velocity decreases with respect to time. Also called **deceleration**.

negative acknowledge character In communications, a message indicating the inability to receive a transmission, or that a transmission has been received incorrectly. This message is sent from the receiving unit or station to the sending unit or station as a means of verification. Its abbreviation is **NAK**.

and λ is the wavelength considered. The region of space closer to the antenna than the radiation zone is the **near-field region**. Also called **far-field region**, **far field** (1), or **Fraunhofer region**.

radiative recombination A recombination in which energy is released in the form of a photon.

radiative transition An energy transition which results in the emission of radiation. For instance, one in which a particle losing energy emits a photon. The converse is true in a **nonradiative transition**.

radiator 1. Any particle, body, material, or system, which emits **radiation**. 2. The part of an antenna or element which emits radio waves. Also called **antenna radiator**. 3. A device or surface which vibrates to produce sound waves. Examples include headphone diaphragms, speaker cones, and distributed-mode speaker panels. Also called **acoustic radiator**, or **sound radiator**. 4. An enclosure which is sealed, except for a small opening through which radiant energy may enter or escape. The radiation of such an enclosure approximates that of a blackbody. Also called **cavity radiator**.

radical 1. An atom or molecule which has one or more unpaired electrons. Radicals are usually highly reactive and unstable. Also called **free radical**. 2. A group of atoms, such as a hydroxyl group, which reacts as a single unit. 3. Arising from, oriented towards, or pointing to an origin, root, or source.

radio- 1. A prefix denoting concepts pertaining to **radiant energy**, or its uses. For example, radiometer. 2. A prefix denoting **radioactive**, or pertaining to radioactivity. For instance, radionuclide.

radio 1. The transmission and/or reception of information, such as voice, video, data, or control signals, in which there are no connecting wires. Instead, such communication is achieved by means of electromagnetic waves, such as radio waves or infrared waves, or via acoustic waves. Also, the specific content. 2. Same as **radio receiver**. 3. The broadcasting of signals which are intended for reception by a radio receiver. 4. Same as **radio transmitter**. 5. Same as **radio transceiver**. 6. Abbreviation of **radio-frequency**. Same as **RF**.

radio altimeter Same as **radar altimeter**.

radio altitude Same as **radar altitude**.

radio antenna An antenna utilized by a **radio** (2), **radio** (4), or **radio** (5).

radio astronomy The study of celestial bodies by detecting and observing RF energy which is emitted and/or reflected by them. Also spelled **radioastronomy**.

radio beacon A non-directional radio transmitter station that emits signals from which bearing information can be derived by using a radio direction finder. Radio beacons may operate continuously, or in response to interrogation signals. Some also provide range information. Also spelled **radiobeacon**. Also known as **radiophare**, or **aerophare**.

radio beam 1. A concentrated and essentially unidirectional stream of radio waves, such as that emitted by a highly directional antenna. 2. An RF signal transmitted in a given direction, such as that of an antenna, radar, or radio beacon.

radio bearing A bearing obtained utilizing a radio direction finder.

radio blackout A complete loss of a radio signal, or of radio-wave propagation. Also called **blackout** (2).

radio broadcast An RF transmission intended for public or general reception. Also, to transmit such signals. Refers especially to radio programming.

radio broadcast band A band of frequencies allocated to broadcasting radio stations. For instance, the standard AM broadcast band is 535 to 1705 kHz.

radio broadcast channel Same as **radio broadcasting channel**.

radio broadcast receiver A device designed to receive radio transmissions intended for public or general reception.

radio broadcast reception The receiving of radio transmissions intended for public or general reception.

radio broadcast service Same as **radio broadcasting service**

radio broadcast station Same as **radio broadcasting station**.

radio broadcast transmission A transmission of radio signals intended for reception by the general public.

radio broadcast transmitter A transmitter of radio signals intended for reception by the general public.

radio broadcasting The transmission of RF signals intended for public or general reception. Refers especially to radio programming.

radio broadcasting channel Same as **radio broadcasting station**.

radio broadcasting service A radio-communications service in which radio signals intended for reception by the general public are transmitted or retransmitted. Also called **radio broadcast service**.

radio broadcasting station A station within a **radio broadcasting service**. Also called **radio broadcast station**, **radio broadcasting channel**, or **radio broadcast channel**.

radio button One of multiple buttons presented on a computer display which allow for the selection of a given option. When a selection is made, all other possibilities are automatically excluded. This contrasts with a **check box**, where multiple choices may be selected together.

radio channel 1. A frequency, or band of radio frequencies, assigned to a particular carrier or station for a specific purpose. For example, the band of radio frequencies assigned to a radio broadcasting station. 2. A frequency, or band of radio frequencies, utilized for radio communications. 3. A wireless medium via which information is conveyed between two or more locations. Also called **radio circuit** (2). 4. Same as **RF channel**.

radio circuit 1. Same as **RF channel**. 2. Same as **radio channel** (3). 3. A circuit within a radio receiver, radio transmitter, or radio transceiver.

radio clock A clock whose time is set via radio signals. For instance, a clock whose indicated time is synchronized with signals received by a radio station which in turn bases its signals on a national time standard. The time kept by such clocks is usually very accurate.

radio common carrier A common carrier which provides RF communications services, such as paging, to the general public. Such entities are usually regulated by the appropriate authorities, such as governmental agencies. This term usually excludes entities providing landline telephone services. Its abbreviation is **RCC**.

radio communication Also spelled **radiocommunication**. 1. Same as **radio communications** (1). 2. Same as **radio communications** (2).

radio communications Also spelled **radiocommunications**. 1. The transmission of information, such as audio, video, data, or control signals, without the use of connecting wires. Instead, such communication is achieved by means of electromagnetic waves, such as radio waves or infrared waves. Also called **radio communication** (1). 2. The information conveyed in **radio communications** (1). Also called **radio communication** (2). 3. The science dealing with **radio communications** (1).

radio compass A radio receiver that automatically and continuously indicates the direction from which a radio signal arrives. Also called **automatic direction finder**, **automatic radio compass**, or **automatic radio direction finder**.

cord for future use. Usually utilized in the context of programming that is recorded for later broadcasting.

transcriber That which serves to **transcribe**.

transcription 1. The process of copying or transferring data from one medium to another, while performing the necessary conversions, such as those involving formatting, to the new medium. Also, the result of such a process. 2. The process of recording for future use. Also, the recording so made.

transcutaneous electrical nerve stimulation The use of electrodes placed on the skin for the application of weak electrical discharges intended to reduce pain. Its acronym is TENS. Also called **transcutaneous nerve stimulation**.

transcutaneous nerve stimulation Same as **transcutaneous electrical nerve stimulation**.

transducer 1. A component, circuit, or device which converts a non-electrical parameter, magnitude, signal, or phenomenon into a proportional or corresponding electrical equivalent. Also, that which performs the converse transformation. For example, a microphone converts acoustic energy into electrical energy, while a speaker converts electrical energy into acoustic energy. There are many other examples, including piezoelectric, magnetic, pressure, photoelectric, and resistive transducers. Nearly all transducers are sensors of some kind. 2. A component, circuit, or device which converts an input in one energy form and produces an output in another energy form. For example, a photoelectric cell converts light energy into electrical energy. 3. A component, circuit, or device which converts a parameter, magnitude, signal, or phenomenon in one form into that in another form. For example, that which converts a movement into a change in pressure, as occurs in a piston.

transducer amplifier 1. An amplifier that increases the output signal of a transducer. 2. An amplifier that increases the input signal of a transducer.

transducer efficiency For a given transducer, the ratio of the power output in the desired form, to the power input.

transductor An electromagnetic device which utilizes one or more saturable reactors to obtain amplification. Depending on the design, a magnetic amplifier can achieve a very large power gain, and may be used, for instance, in servo systems requiring sizeable amounts of power to move heavy loads. Also called **magnetic amplifier**.

transfer 1. To move or cause to move or pass from one location or entity to another. For example, a charge, power, heat, or funds transfer. Also, such a movement or passing. 2. The movement or copying, without alteration, of data from one location to another. This may be, for instance, across a data bus, a peripheral bus, or between nodes of a network, to name a few. Also called **data transfer**.

transfer characteristic 1. The relationship between an input magnitude, such as a voltage, to an output magnitude, such as a current. Also, the relation between an output magnitude, such as a voltage, to an input magnitude, such as a current. Usually expressed as a graph or plot. 2. The relationship of the voltage of one electrode to the current of another, with all other electrodes having a fixed voltage. 3. The relationship between the illumination incident upon a camera tube and the output signal current, under specified conditions.

transfer check A verification of the accuracy of a **transfer** (2).

transfer function A mathematical function which expresses the relationship between the output of a component, circuit, device, piece of equipment, or system, and its input. For instance, the relationship between the output of a linear control system and its input.

transfer impedance A measure of the shield effectiveness of a transmission line, such as a cable. The lower the transfer impedance, the more effective the shielding.

transfer protocol A protocol utilized for transferring data and/or files over a communications network, such as the Internet.

transfer rate The speed at which bits or bytes are transmitted over a communications line or bus. Usually measured in some multiple of bits or bytes per second. Also called **data rate**, **data transfer rate**, **bit transfer rate**, **bit rate**, or **line rate**.

transfer resistor Same as **transistor**.

transfer time 1. The time that elapses between one set of contacts being opened and another set of contacts being closed. 2. In an uninterruptible power supply, the time that elapses between the failure of the primary source, such as mains AC, and the transfer of power to the battery or generator. 3. The time required for data to be transferred from one point to another. For example, that required for transfers between nodes, or for a download to be completed.

transform 1. To change in nature, function, operation, state, format, or the like, from one form or manifestation into another. 2. To transfer energy using a **transformer**.

transformation 1. The process of changing in nature, function, operation, state, format, or the like, from one form or manifestation into another. Also, having undergone such a transformation. 2. The transfer of energy using a **transformer**.

transformation ratio Same as **turns ratio**.

transformer A component or device which is utilized to transfer electrical energy from one circuit to another via **magnetic or electromagnetic induction**. A transformer has no moving parts and consists of **two or more coils of wire separately wrapped around a magnetic core**. The coils are inductively linked by magnetic lines of force, and do not come into physical contact. A transformer is usually utilized to change electrical energy at one AC voltage to another, with a step-down transformer providing an output voltage lower than its input voltage, and a step-up transformer providing an output voltage higher than its input voltage. The winding that is directly connected to the input power is the primary, while the winding or windings that provide the output to the load or loads are the secondaries. The output of a variable transformer can be adjusted between given values.

transformer-coupled amplifier An amplifier whose stages are coupled via **transformers**.

transformer coupling The coupling of two circuits by means of a mutual inductance provided by a transformer. In RF circuits, for instance, such coupling minimizes the capacitance between stages, which improves performance. Also called **inductive coupling** (2).

transformer efficiency For a given transformer, the ratio of the output power to the input power. Usually expressed as a percentage.

transformer hybrid A hybrid junction incorporating two or more transformers. Also called **hybrid set**.

transformer input current Same as **transformer primary current**.

transformer input voltage Same as **transformer primary voltage**.

transformer loss Also called **transformer losses**. 1. Any power which is dissipated by a transformer without performing useful work. 2. The ratio of the power an ideal transformer would deliver to a load under specified conditions, to the power a given transformer actually delivers to the same load under the same conditions. Usually expressed in decibels.

transformer losses Same as **transformer loss**.

transformer oil A specially-processed insulating oil, such as mineral oil, utilized in transformers. WiTricity Corp.

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