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comparable means to insure a low rate of gas leakage over a long period of time. *See:* **relay.** 259

hermetic motor. A stator and rotor without shaft, end shields, or bearings for installation in refrigeration compressors of the hermetically sealed type. 63

hermetic refrigerant motor-compressor (air-conditioning and refrigerating equipment) (National Electrical Code). 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. 256

hermitian form (circuits and systems). The nxn matrix $[A]$ is hermitian if its conjugate transpose is equal to $[A]$ itself. In terms of a set of complex variables; x_1, x_2, . . . x_n; the quantity

$$[\overline{x}_1\ \overline{x}_2 \ldots \overline{x}_n][A]\begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \end{bmatrix}$$

is the hermitian form of $[A]$. 67

hertz (1) (general) (Hz). The unit of frequency, one cycle per second. 3, 59, 53

(2) (transformer). The unit of frequency, (cycles per second). 53

(3) (metric practice). The frequency of a periodic phenomenon of which the period is one second. 21

(4) (laser-maser). The unit which expresses the frequency of a periodic oscillation in cycles per second. 363

Hertzian electric dipole (antennas). 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. 111

Hertzian magnetic dipole (antennas). 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. 111

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. 530

heterodyne conversion transducer (converter). A conversion transducer in which the useful output frequency is the sum or difference of (1) the input frequency and (2) 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. 125

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:* **superheterodyne reception.** 328

heterojunction (fiber optics). A junction between semiconductors that differ in their doping level conductivities, and also in their atomic or alloy compositions. *See:* **homojunction.** 433

heteropolar machine (rotating machinery). A machine having an even number of magnetic poles with successive (effective) poles of opposite polarity. *See:* **asynchronous machine.** 63

heuristic. Pertaining to exploratory methods of problem solving in which solutions are discovered by evaluation of the progress made toward the final result. *See:* **algorithm.** 255, 77, 54

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

hexadecimal (mathematics of computing). (1) Pertaining to a selection in which there are sixteen possible outcomes. (2) Pertaining to the numeration system with a radix of 16. 564

hexode. A six-electrode electron tube containing an anode, a cathode, a control electrode, and three additional electrodes that are ordinarily grids. 125

HF (high-frequency). A radar frequency band between 3 megahertz and 30 megahertz. 13

HF (high-frequency) radar. A radar operating at frequencies between 3 to 30 megahertz. 13

See: **radio spectrum.**

hickey. (1) 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. (2) A pipe-bending tool. 328

hierarchical decomposition (software). A method of designing a system by breaking it down into its com-

life performance curve (illuminating engineering). A curve which represents the variation of a particular characteristic of a light source (luminous flux, intensity, etcetera) throughout the life of the source. *Note:* Life performance curves sometimes are called maintenance curves as, for example, lumen maintenance curves. 167

life safety branch (1) (health care facilities). A subsystem of the Emergency System consisting of feeders and branch circuits, meeting the requirements of Article 700 of NFPA 70-1978, National Electrical Code, and intended to provide adequate power needs to ensure safety to patients and personnel, and which can be automatically connected to alternate power sources during interruption of the normal power source. 192

life support equipment (nuclear power generating station). The breathing apparatus, medical supplies, sanitary facilities, and food and water supplies required to sustain operators for an extended period of time during abnormal operating conditions. 439

life test. *See:* **accelerated test (reliability).**

life test of lamps (illuminating engineering). A test in which lamps are operated under specified conditions for a specified length of time, for the purpose of obtaining information on lamp life. Measurements of photometric and electric characteristics may be made at specified intervals of time during this test. 167

lifetime rated pulse currents (low voltage varistor surge arresters). Derated values of rated peak single pulse transient current for impulse durations exceeding that of an 8 x 20-μs waveshape, and for multiple pulses which may be applied over the device rated lifetime. 62

lifetime, volume (semiconductor). The average time interval between the generation and recombination of minority carriers in a homogeneous semiconductor. *See:* **semiconductor; semiconductor device.** 245

lifting eye (fuseholder, fuse unit, or disconnecting blade) (high-voltage switchgear) (power switchgear). An eye provided for receiving a fuse hook or switch hook for inserting the fuse or disconnecting blade into and for removing it from the fuse support. 443, 103

lifting-insulator switch (power switchgear). One in which one or more insulators remain attached to the blade, move with it, and lift it to the open position. 103

light (1) (fiber optics). (1) In a strict sense, the region of the electromagnetic spectrum that can be perceived by human vision, designated the visible spectrum and nominally covering the wavelength range of 0.4 μm to 0.7 μm. (2)In the laser and optical communication fields, custom and practice have extended usage of the term to include the much broader portion of the electromagnetic spectrum that can be handled by the basic optical techniques used for the visible spectrum. This region has not been clearly defined but, as employed by most workers in the field, may be considered to extend from the near-ultraviolet region of approximately 0.3 μm, through the visible region, and into the mid-infrared region to 30 μm. *See:* **infrared (IR); optical spectrum; ultraviolet (UV).** 433

(2) (illuminating engineering). Radiant energy that is capable of exciting the retina and producing a visual sensation. The visible portion of the electromagnetic spectrum extends from about 380 to 770 nm. *Note:* The subjective impression produced by stimulating the retina is sometimes designated as light. Visual sensations are sometimes arbitrarily defined as sensations of light, and in line with this concept it is sometimes said that light cannot exist until an eye has been stimulated. Electrical stimulation of the retina or the visual cortex is described as producing flashes of light. In illuminating engineering, however, light is a physical entity–radiant energy weighted by the luminous efficiency function. It is a physical stimulus which can be applied to the retina. *See:* **spectral luminous efficiency of radiant flux; values of spectral luminous efficiency for photopic vision.** 167

light adaptation (illuminating engineering). The process by which the retina becomes adapted to a luminance greater than about 3.4 cd/m^2,(2.2×10^{-3} cd/in^2)(1.0fL). 167

light center (illuminating engineering). The center of the smallest sphere that would completely contain the light-emitting element of the lamp. 167

light center length (illuminating engineering). The distance from the light center to a specified reference point on the lamp. 167

light current. *See:* **photocurrent.**

lighted beacon (navigation aid terms). A beacon that transmits signals by light waves (for example, light house). 526

lighted buoy (navigation aid terms). A buoy with a light that has characteristics for detection and identification. *See:* **buoy.** 526

light emitting diode (LED) (1) (fiber optics). A pn junction semiconductor device that emits incoherent optical radiation when biased in the forward direction. *See:* **incoherent.** 433

(2) (illuminating engineering). A p-n junction solid-state diode whose radiated output is a function of its physical construction, material used, and exciting current. The output may be in the infrared or in the visible region. 167

lightguide. *See:* **optical waveguide.**

lighting branch circuit (electric installations on shipboard). A circuit supplying energy to lighting outlets only. (Lighting branch circuits also may supply portable desk or bracket fans, small heating appliances, motors of 1/4 hp (186 1/2 W) and less, and other portable apparatus of not over 600 W each.) 3

lighting effectiveness factor (LEF) (illuminating engineering). The ratio of equivalent sphere illumination to measured or calculated task illuminance. 167

lighting outlet (1) (electric installations on shipboard). An outlet intended for the direct connection of a lampholder or a lighting fixture. 3

(2) (National Electrical Code). An outlet intended for the direct connection of a lampholder, a lighting fix-

radiation thermometer. *See:* **radiation pyrometer.**

radiation trapping (laser-maser). The suppression or delay of fluorescence in an optically thick absorbing medium resulting from **absorption** and re-emission. 363

radiative relaxation time (laser-maser). The relaxation time which would be observed if only processes involving the radiation of electromagnetic energy were effective in producing relaxation. 363

radiator (1) (illuminating engineering). An emitter of radiant energy. 167

(2) (telecommunication). Any antenna or radiating element that is a discrete physical and functional entity. 111

radio-acoustic ranging (navigation aid terms). Determining distance by a combination of radio and sound. *Syn:* **echo ranging.** 526

radioactive check source (liquid-scintillation counters). A radioactive sample used to monitor the operational status of an instrument. The approximate activity should be known. 498

radioactivity standard (sodium iodide detector). A radioactivity standard, as used in this text, is either a radioactivity standard that has been certified by a laboratory recognized as a country's National Standardizing Laboratory for radioactivity measurements or a radioactivity standard that has been obtained from a supplier who participates in measurement assurance activities with the National Standardizing Laboratory when such standards are available. In such measurement assurance activities, the supplier's calibration value should agree with the National Standardizing Laboratory value within the overall uncertainty stated by the supplier in its certification of the same batch of sources or in its certification of similar sources. 423

radio altimeter (navigation aid terms). An altimeter using radar principles for height measurement. Height is determined by measurement of propagation time of a radio signal transmitted from the vehicle and reflected back to the vehicle from the terrain below. *Syn:* **radar altimeter.** 526

radio astronomy (radio wave propagation). The branch of astronomy dealing with the passive reception and analysis of electromagnetic radiations of radio wavelength from extraterrestrial sources. 146

radio-autopilot coupler (navigation aid terms). Equipment providing means by which electrical signals from navigation receivers control the vehicle autopilot. 526

radio beacon (navigation aid terms). A facility, usually a nondirectional radio station, emitting identifiable signals intended for radio direction finding observations. *See:* **nondirectional beacon.** 526

radio-beacon buoy (navigation aid terms). A buoy equipped with a marker-radio beacon. *See:* **buoy.** 526

radio broadcasting. Radio transmission intended for general reception. *See:* **radio transmission.** 111,240

radio channel (data transmission) (antennas). A band of frequencies of a width sufficient to permit its use for radio communication. *Note:* The width of the channel depends on the type of transmission and the tolerance for the frequency of emission. Normally allocated for radio transmission in a specified type of service or by a specified transmitter. 111, 59

radio circuit. A means for carrying out one radio communication at a time in either or both directions between two points. *See:* **radio channel; radio transmission.** 328

radio compass. A direction-finder used for navigational purposes. *See:* **radio navigation.** 328

radio compass indicator. A device that, by means of a radio receiver and rotatable loop antenna, provides a remote indication of the relationship between a radio bearing and the heading of the aircraft. 328

radio compass magnetic indicator. A device that provides a remote indication of the relationship between a magnetic bearing, radio bearing, and the aircraft's heading. 328

radio control. The control of mechanism or other apparatus by radio waves. *See:* **radio transmission.** 328

radio detection (radio warning). The detection of the presence of an object by radiolocation without precise determination of its position. *See:* **radio transmission.** 328

radio direction-finder (RDF)(navigation aid terms). A device used to determine the direction of arrival of radio signals. *Syn:* **directional finder (DF).** 526

radio direction finding (navigation aid terms). A procedure for determining the bearing, at a receiving point, of the source of a radio signal by observing the direction of arrival and other properties of the signal. 526

radio distress signal (SOS). Radiotelegraph distress signal consists of the group . . . --- . . . in Morse code, transmitted on prescribed frequencies. The radiotelephone distress signal consists of the spoken words **May Day (m'aidez = help me).** *Note:* By international agreement, the effect of the distress signal is to silence all radio traffic that may interfere with distress calls. 328

radio disturbance (electromagnetic compatibility). An electromagnetic disturbance in the radio-frequency range. *See:* **radio interference; radio noise.** 199

radio Doppler. The direct determination of the radial component of the relative velocity of an object by an observed frequency change due to such velocity. *See:* **radio transmission.** 328

radio fadeout (Dellinger effect). A phenomenon in radio propagation during which substantially all radio waves that are normally reflected by ionospheric layers in or above the *E* region suffer partial or complete absorption. *See:* **radiation.** 328

radio field strength (radio wave propagation). The electric or magnetic field strength at radio frequency. 146

radio frequency (1) (data transmission). (A) (Loosely). The frequency in the portion of the electromagnetic spectrum that is between the audio-frequency portion

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