ELECTRONICS DICTIONARY

FOURTH EDITION

JOHN MARKUS

ELECTRONICS DICTIONARY

Accurate, easy-to-understand, and up-to-date definitions for 17,090 terms used in solid-state electronics, computers, television, radio, medical electronics, industrial electronics, satellite communication, and military electronics

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Preface

The *Electronics Dictionary* is intended to serve as a guide for engineers, technical writers, advertising copywriters, technicians, students, and secretaries. It is the fourth edition of a book that was launched in 1945 with the collaboration of the late Nelson M. Cooke. Each edition has presented an updated picture of the continually changing and expanding language of electronics.

To keep pace with the growth of the electronics industry this edition had to be increased in size, even though many obsolete terms were dropped. The dictionary contains a total of 17,090 new and updated entries, supplemented by 1159 illustrations that were carefully chosen to clarify the more complex definitions. Thousands of new terms cover recent developments in digital watches, lasers, microcomputers, pocket calculators, satellite communication, space electronics, video games, and a host of other new developments of the past decade. Interesting new terms include ambisonics, angle jamming, autoranging, bubble memory, bucket counter, cache memory, codar, coercimometer, cruise missile, dibit, difar, domain-tip memory, EFTS, etalon, ferpic, handshaking, MIRV,

pretersonics, quadraphonic, slot mask, sonography, unbundling, VFET, video game, and voiceprint. Nucleonics terms generally have been dropped in order to make room for more of the strictly electronics terms.

Completely new in this edition is an Electronics Style Manual, which is a convenient and quick reference to the abbreviating, hyphenating, and spelling rules that were followed in this dictionary. The style manual was developed because the three previous editions were official style guides for many commercial and government organizations. Used in conjunction with the dictionary, this style manual can eliminate time-wasting hours of arguments and greatly reduce manuscript editing and composition resetting costs. In addition, the style manual will apply to new terms expected to evolve during the life of this edition.

Many new terms go through an evolutionary phase between first usage and eventual adoption as part of the language of electronics. Thus a compound term starts out as two words, next takes on a hyphen, and then becomes one word, as in *push button, push-button,* and *pushbutton.* To help trace this evolution of both old and new terms, more than 50,000 citations were mounted on cards coded as to source, and file drawers were filled with article tearsheets on which possible new terms and examples of their uses were circled. After being alphabetically sequenced, this source material was analyzed to determine the word forms and meanings that best represent current usage. For example, research for the third edition indicated that *programming* and its related forms would follow the normal trend toward simplified spelling, so only one m was used in spelling such terms. How wrong that assumption was! *Programming* has two m's in this edition, and we're shopping for a new crystal ball.

Another example of language in transition is the abbreviation for operational amplifier. Today it is seen in many different forms, including Op Amp, Op-Amp, OP AMP, op amp, op-amp, and Op. Amp. The most logical form, based on historical precedent, is opamp. This was accordingly selected for the fourth edition, even though rarely used today. Will it click?

For abbreviations, company ads and catalogs and recent periodicals and books were studied. Actual usage counts were made of the various forms seen for each abbreviation, with maximum weight being given to publications that have a consistent style. This analysis showed a strong trend to all capital letters for abbreviations of common words and phrases, so practically all the abbreviations were changed to capital letters in the fourth edition.

There are two innovations in this edition: (1) a change to the internationally adopted SI abbreviations for units of measure, and (2) the addition of metric equivalents or changeover to metric units.

All terms are alphabetized letter by letter, ignoring spaces and hyphens, to give a consistent sequence in which a desired word is always where you expect it to be. Entries starting with a Greek letter are alphabetized as if the letter were spelled out.

A definition is given only once, to keep down the size of the dictionary. Synonyms are listed in their own alphabetic order, each followed by the preferred term, in italics, under which the complete definition is given.

Trademarks are capitalized. The correct use of trademarks will avoid unpleasant correspondence with corporate lawyers.

Thanks are again extended to The Institute of Electrical and Electronics Engineers and other professional organizations for permission to use in earlier editions their official definitions and illustrations, many of which were transferred unchanged to this new fourth edition. Credit for illustrations goes also to Bell Telephone Laboratories, Central Scientific Company, General Electric Company, NBS, Philco Corporation, RCA, United States Navy, Westinghouse Electric Corporation, and other electronics firms; to *IEEE Spectrum* and other IEEE publications; to *Electronics, Microwave Journal, MicroWaves, Popular Science, Radio-Electronics, QST, 73 Magazine,* and other industry publications;

and to the authors of many McGraw-Hill books. Thanks are also extended to the many engineers in the San Francisco Bay area who answered hundreds of questions about current usage and contributed to definitions of new terms.

Finally, to Joan Fife goes full credit for typing new words and definitions exactly as dictated, for her constructive help in establishing styles that represent current usage, and for her many helpful discussions, which contributed so much to the accuracy and usefulness of the definitions.

A dictionary is a growing thing, never quite complete and never perfect, no matter how much time is spent in its compilation. I accordingly welcome all suggestions for additions and corrections, which should be addressed in care of McGraw-Hill Book Company.

JOHN MARKUS

Contents

A

a Abbreviation for *atto-*.

A 1. Abbreviation for *ampere*. 2. Symbol for *anode*. 3. Symbol for *argon*.

Å Abbreviation for *angstrom*.

A− [A minus] The negative terminal of the filament voltage source for an electron tube.

A+ [A plus] The positive terminal of the filament voltage source for an electron tube.

abacus An instrument for performing arithmetic calculations manually by sliding markers on rods. Similar to biquinary notation used in some computers.

A battery The battery that supplies power for filaments or heaters of electron tubes in battery-operated equipment.

abbreviated dialing A telephone exchange service in which a connection is established with fewer than the normal number of digits. Widely used for emergency calls; for example, in Sunnyvale, California, dialing 911 connects one to the radio dispatcher for police, fire, and ambulance service.

ABC 1. Abbreviation for *automatic bass compensation*. 2. Abbreviation for *automatic brightness control*.

aberration An image defect that occurs when an optical lens or mirror does not bring all light rays to the same focus or when an electron lens does not bring the electron beam to the same sharp focus at all points on the screen of a cathode-ray tube.

ABM Abbreviation for *antiballistic missile*.

abnormal glow discharge A glow discharge characterized by an increase in the voltage drop as the current increases. It occurs when the current is increased beyond the point at which the cathode of the gas tube is completely covered with glow.

abnormal propagation Radio wave propagation in which unstable atmospheric and/or ionospheric conditions interfere with communication.

abnormal reflection A sharply defined reflection of radio waves from an ionized layer of the ionosphere, occurring at frequencies higher than the critical or penetration frequency of the layer. Also called sporadic reflection.

abort Failure of a guided missile or aerospace vehicle to accomplish its objective for any reason other than enemy action.

abrasion resistance The ability of a material to withstand mechanical wear, such as that produced by movement of a contact, brush, or wiper arm.

abrupt junction A junction in which the transition from P- to N-type material is effectively discontinuous in a single-crystal semiconductor.

abscissa The horizontal distance from a point on a graph to the zero reference line. The units of this distance are indicated on a scale at the bottom or top of the graph.

absolute address An address assigned to a particular storage location during the design of a computer. Also called specific address.

absolute altimeter An altimeter that registers the absolute altitude of an aircraft above the earth or sea over which the aircraft is flying. The frequency-modulated altimeter and the radar altimeter are the most common examples in current use.

absolute altitude The height or altitude of an aircraft above the surface or terrain over which it is flying.

absolute code A code that indicates the exact location where an item of data is to be found or stored in a computer.

absolute cutoff frequency The lowest frequency at which a waveguide will propagate energy without attenuation.

absolute delay The predetermined time interval between the transmission of two synchronized radio, radar, or loran signals from the same station or different stations.

absolute drift The amount of inherent unbalance in a magnetic amplifier, measured in terms of the watts, amperes, or ampere-turns of input signal required for rebalancing.

absolute error The magnitude of an error, disregarding its algebraic sign or direction.

absolute pressure Pressure with respect to a vacuum.

absolute temperature scale A temperature scale in which zero is the absolute zero of temperature, −273.16°C or −459.69°F. The most commonly used scale is the kelvin scale, which uses Celsius (centigrade) degrees; here absolute zero is 0 K, water freezes at 273.16 K and boils at 373.16 K. The less-used Rankine scale is based on Fahrenheit degrees; here water freezes at 491.69°R and boils at 671.69°R.

absolute unit A unit defined in terms of fundamental units of mass, length, time, and charge, such as the centimeter-gram-second electromagnetic and electrostatic units and the meter-kilogram-second-ampere electromagnetic units.

absolute value The numerical value of a number without regard to sign. Vertical lines on each side of a symbol specify that its absolute value is intended. Thus the absolute value of Z is written |Z|.

absolute-value converter A converter that changes an AC input signal to a unidirectional output signal while preserving instantaneous waveform amplitudes.

absolute-value device A computing element that produces an output equal to the magnitude of the input signal but always of one polarity.

absolute zero The lowest temperature that can exist, corresponding to a complete absence of molecular motion. Absolute zero is approximately −273.16°C or −459.69°F.

absorbed dose *Dose.*

absorbed dose rate The dose per unit of time, measured in rads per unit time.

absorber A material or device that takes up and dissipates radiated energy. It may be used to shield an object from that energy, prevent reflection of the energy, determine the nature of the radiation, or selectively transmit one or more components of the radiation. Examples are acoustic absorbers and microwave absorbers.

absorptance The ratio of the radiant energy absorbed in a body of material to the incident radiant energy.

absorptiometer An instrument that determines the concentration of substances by their absorption of nearly monochromatic radiation at a wavelength selected by filters or by a simple radiation-dispersing system.

absorption The dissipation of energy by radiation passing through a medium. Thus some electromagnetic energy is lost when radio waves travel through the atmosphere. Acoustic energy is lost when sound waves pass through an object. The kinetic energy of a nuclear particle is reduced when it passes through a body of matter. In another nuclear example of absorption, a particle is absorbed by a nucleus in the medium, with a different type of particle sometimes being emitted as a result.

absorption band A region of the absorption spectrum of a material in which the amount of absorption passes through a maximum.

absorption circuit A series resonant circuit used to absorb power at an unwanted signal frequency. The circuit provides a low impedance to ground at this frequency.

absorption coefficient The fraction of the intensity of a radiation that is absorbed by a unit thickness of a particular substance.

absorption cross section The sum of the cross sections for all neutron reactions with an atom except elastic and inelastic collisions.

absorption current The component of dielectric current that is proportional to the rate of accumulation of electric charges within the dielectric.

absorption discontinuity A discontinuity in the absorption coefficient of a substance for a particular type of radiation.

absorption edge The wavelength that corresponds to an absorption discontinuity.

absorption fading Gradual changes in the strength of a received radio signal, caused primarily by slow changes in absorption by the atmosphere along the signal path.

absorption frequency meter *Absorption wavemeter.*

absorption line A dark line corresponding to a peak in the absorption spectrum of a gas or a vapor.

absorption loss 1. That part of the transmission loss which is converted into heat when radiated energy is transmitted or reflected by a material. 2. Power loss in a transmission circuit caused by coupling to an adjacent circuit.

absorption mesh A filter used in a waveguide to absorb electromagnetic energy at undesired frequencies.

absorption modulation A system of amplitude modulation in which a variable-impedance device is inserted in or coupled to the output circuit of the transmitter, to absorb carrier power in accordance with the intelligence to be transmitted. In one system the modulator tubes control the absorption of the transmission line directly by means of stub connections, to achieve the same result. Also called loss modulation.

absorption peak Abnormally high attenuation at a particular frequency as a result of absorption loss.

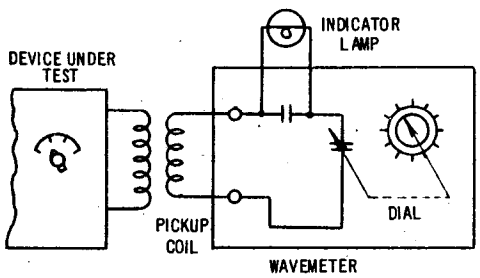
absorption spectrophotometer A spectrophotometer in which absorption of radiation by a sample at a given wavelength is used to identify the unknown material.

absorption spectroscopy Spectroscopy that involves measurement of the energies and wavelengths of radiation absorbed by atoms and molecules of matter under various conditions.

absorption spectrum The spectrum obtained when continuous radiation is passed through an absorbing medium before it enters a spectroscope. The resulting recorded spectrum shows dark lines at wavelengths corresponding to maximum absorption.

absorption trap A parallel-tuned circuit used to absorb and thereby attenuate interfering signals.

absorption wavemeter A wavemeter that consists of a calibrated tuned circuit and a resonance indicator. When the wavemeter is lightly coupled to a signal source and tuned to resonance, maximum energy is absorbed from the source. The



Absorption wavemeter using lamp to indicate resonance.

unknown wavelength or frequency is then read on the calibrated tuning dial. With waveguides, a cavity-type resonant circuit is used. Also called absorption frequency meter. When a vacuum-tube oscillator is a part of the resonance indicator, the instrument is usually called a grid-dip meter.

absorptive attenuator A waveguide section that contains dissipative material which gives a desired transmission loss.

absorptivity A measure of the portion of incident radiation or sound energy absorbed by a material.

AB test A method of comparing two sound systems by switching inputs so the same recording is heard in rapid succession over one system and then the other.

abundance ratio The ratio of the number of atoms of one isotope to the number of atoms of another isotope of the same element in a given sample.

AC Abbreviation for *alternating current.*

AC adapter A small power supply that plugs into an AC power outlet and delivers the DC voltage required by a portable calculator, tape recorder, or other portable battery-operated device.

AC bias An AC signal that is applied to a magnetic tape recording head along with the signal being recorded, to improve frequency response and minimize distortion and noise. The bias frequency must be several times the highest frequency value recorded.

accelerated life test Operation of a device, circuit, or system above maximum ratings to produce premature failure. Used to estimate normal operating life.

accelerating chamber An evacuated glass, metal, or ceramic envelope in which charged particles are accelerated.

accelerating electrode An electrode used in cathode-ray tubes and other electron tubes to increase the velocity of the electrons that constitute the space current or form a beam. Such an electrode is operated at a high positive potential with respect to the cathode.

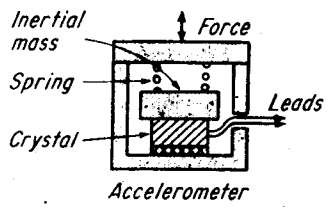
accelerating tube A tubular accelerating chamber. It may be toroidal, as in a betatron, or in the form of a long cylinder, as in a linear accelerator.

acceleration The rate at which the velocity of a body changes.

acceleration space The region just outside the output aperture of the electron gun in an electron tube, in which electrons are accelerated to a desired higher velocity.

accelerator Any machine that accelerates charged particles to high velocities so they have high kinetic energy. It can be used for electrons, protons, deuterons, and ions. Also called particle accelerator. Examples include the betatron, cyclotron, linear accelerator, synchrocyclotron, synchrotron, and Van de Graaff electrostatic generator. Also called atom smasher.

accelerograph An accelerometer that records the acceleration of a point on the earth during an earthquake or records any other type of acceleration.



Accelerometer using piezoelectric crystal having constant-pressure loading produced by spring and inertial mass. Upward or downward acceleration changes this pressure, giving output voltage proportional to acceleration.

accelerometer A device that measures the acceleration of a moving body and translates it into a corresponding electrical quantity.

accentuation *Preemphasis.*

accentuator A circuit that provides preemphasis of certain audio frequencies.

acceptable quality level [abbreviated AQL] The percentage of defects that will be accepted a predetermined percentage of the time by a sampling plan during inspection or test of a product.

acceptable reliability level [abbreviated ARL] The percentage of failures allowed per thousand operating hours for acceptance of production parts or equipment. It is a measure of the reliability that will be accepted a predetermined percentage of the time by a reliability sampling plan.

acceptance angle The solid angle within which all received light reaches the light-sensitive area of a phototube, photodiode, or other light-sensitive device in its housing.

acceptance sampling plan A plan that specifies the sample sizes for incoming inspection and the test criteria for acceptance, rejection, or taking of another sample.

acceptance test A test that determines conformance of a product to design specifications, as a basis for acceptance.

acceptor An impurity element that increases the number of holes in a semiconductor crystal like germanium and silicon. Current flow is then essentially due to transfer of holes. Because these holes are equivalent to positive charges, the resulting alloy is called a P-type semiconductor. Aluminum, gallium, and indium are examples of acceptors.

acceptor circuit A series resonant circuit that has a low impedance at the frequency to which it is tuned and a higher impedance at all other frequencies. Used in series with a signal path to pass the desired frequency.

acceptor level An intermediate level close to the normal band in the energy-level diagram of an extrinsic semiconductor. It is empty at absolute zero. At other temperatures some electrons corresponding to the normal band can acquire energies corresponding to this intermediate level.

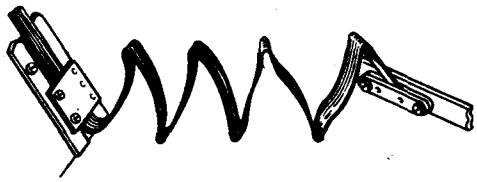
accessory A part, subassembly, or assembly that contributes to the effectiveness of a piece of equipment without changing its basic function. An accessory may be used for testing, adjusting, calibrating, recording, or other purposes.

access time 1. *Read time.* 2. *Write time.*

accidental coincidence Coincidence caused by the chance occurrence of unrelated counts in separate radiation detectors. Also called chance coincidence and random coincidence.

accidental coincidence correction The correction made in coincidence counting to offset the chance occurrence of unrelated signals within the resolving time of the apparatus.

accidental jamming Jamming due to transmission of radio or radar signals by friendly equipment.



Accordion cable, as used with stress relief clamps to prevent tension on soldered connections.

accordion cable A flat multiconductor cable that is prefolded into a zigzag shape and used to make connections to movable equipment like a chassis mounted on pullout slides.

AC coupling A coupling arrangement that will not pass direct current or a DC component of a signal.

accumulating stimulus A current that is increased gradually, so it is less effective than if suddenly increased to final intensity. Used in electrobiology.

accumulator 1. A computer device that stores a number and, on receipt of another number, adds it to the number already stored and stores the sum. In another version, stored integers can be increased by unity or an arbitrary integer. An accumulator can be reset to either zero or an arbitrary integer. Also called counter. 2. British term for *storage battery.*

accuracy 1. The quality of being free from errors. 2. The extent to which the indications of an instrument approach the true values of the quantities measured.

AC/DC An abbreviation used to indicate that a receiver or other equipment will operate from either an AC or DC power line.

AC/DC receiver A radio receiver that operates from either an AC or DC power line. Also called universal receiver.

AC dump The removal of all AC power from a computer intentionally, accidentally, or conditionally. It usually results in the removal of all power.

AC erase Use of alternating current to energize an erasing head.

AC erasing head A magnetic head that uses alternating current to produce the gradually decreasing magnetic field necessary for erasing recorded signals.

acetate *Cellulose acetate.*

acetate base A transparent backing film for magnetic recording tape and motion-picture film, made from cellulose acetate. Also called safety base.

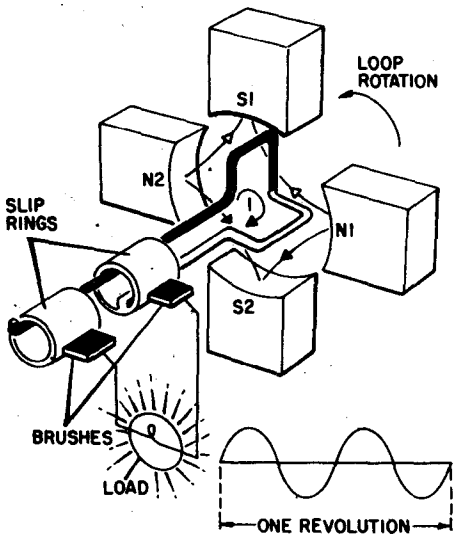
acetate disk A mechanical recording disk, either solid or laminated, made of various acetate and cellulose nitrate compounds.

acetate tape A magnetic recording tape that has an acetate base.

AC fan-out The fan-out limit of a logic circuit under high-speed conditions. Parasitic capacitances can reduce the permissible number of fan-

outs to almost half that for DC conditions.

AC generator A rotating electric machine that converts mechanical power into AC electric power.



AC generator having four poles, simplified to show operating principle.

achromatic 1. Without color. 2. Capable of transmitting light without breaking it up into constituent colors.

achromatic antenna An antenna whose characteristics are uniform in a specified frequency band.

achromatic color A shade of gray.

achromatic lens A lens combination that gives correction for chromatic aberration. It is usually a convex lens of crown glass and a concave lens of flint glass; one lens corrects for the errors of the other. The combination brings all colors of light rays nearer to the same focus point.

achromatic locus An area on a chromaticity diagram that contains all points that represent acceptable reference white standards. Also called achromatic region.

achromatic point A point on a chromaticity diagram that represents an acceptable reference white standard.

achromatic region *Achromatic locus.*

achromatic stimulus A visual stimulus that gives the sensation of white light and thus has no hue.

AC Josephson effect *Josephson effect.*

aclinic line *Isoclinic line.*

acorn tube A UHF vacuum tube that resembles an acorn in shape and size. Leads come out directly through the sides of the tube. Small electrodes give low interelectrode capacitances, and close electrode spacings give low electron transit time.

acoubuoy An acoustic listening device similar to a sonobuoy, used on land to form an electronic fence that will pick up sounds of enemy movements and transmit them to orbiting aircraft or land stations.

acoustic Containing, producing, arising from, actuated by, related to, or associated with sound. The adjective acoustic is used (rather than acoustical) when the term being qualified designates something that has the properties, dimensions, or physical characteristics associated with sound waves.

acoustic absorption coefficient *Sound absorption coefficient.*

acoustic absorption loss Energy lost by conversion into heat or other forms when sound passes through or is reflected by a medium.

acoustic absorptivity *Sound absorption coefficient.*

acoustical Containing, producing, arising from, actuated by, related to, or associated with sound. The adjective acoustical (rather than acoustic) is used when the term being qualified does not explicitly designate something that has the properties, dimensions, or physical characteristics associated with sound waves.

acoustical attenuation constant The real part of the acoustical propagation constant. The commonly used unit is the neper per section or per unit distance.

acoustical intelligence Intelligence derived from sounds made by enemy sources.

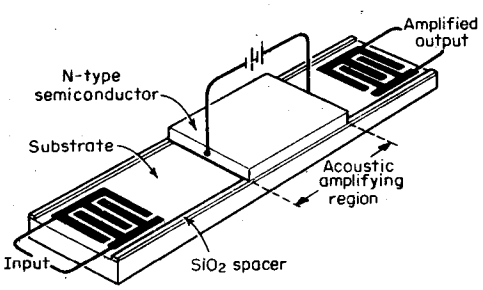
acoustical ohm A unit of acoustic resistance, acoustic reactance, or acoustic impedance. The magnitude is 1 acoustical ohm when a sound pressure of 1 dyn/cm^2 (1 μbar) produces a volume velocity of 1 cm^3/s. Also called acoustic ohm.

acoustical phase constant The imaginary part of the acoustical propagation constant. The commonly used unit is the radian per section or per unit distance.

acoustical propagation constant A rating for a sound medium. It is the natural logarithm of the complex ratio of particle velocities, volume velocities, or pressures at two points in the path of a sound wave. The ratio is determined by dividing the value at the point nearer the sound source by the value at the more remote point. The real part of this constant is the acoustical attenuation constant, and the imaginary part is the acoustical phase constant.

acoustical reciprocity theorem A theorem that applies to an acoustic system. The theorem states that a simple sound source at point A in a region will produce the same sound pressure at another point B as would have been produced at A had the source been located at B.

acoustic amplifier An amplifier that increases the strength of a bulk or surface acoustic wave by an interaction involving energy transfer from traveling electric fields generated by acoustic waves in or on a piezoelectric semiconductor. The resulting charge carriers lose velocity during bunching if



Acoustic amplifier using interdigital transducers at input and output.

the drift field is optimized for maximum amplification, and the excess kinetic energy is transferred to the acoustic wave. Also called acoustoelectric amplifier.

acoustic burglar alarm A burglar alarm that is responsive to sounds produced by an intruder. Microphones concealed in the rooms to be protected are connected to audio amplifiers that trip an alarm when sounds exceed a predetermined normal level. Also called acoustic intrusion detector.

acoustic clarifier A system of cones loosely attached to the baffle of a loudspeaker, to vibrate and absorb energy during sudden loud sounds in order to suppress these sounds.

acoustic compensator A device that matches acoustical path lengths in binaural or stereophonic audio equipment.

acoustic compliance The reciprocal of acoustic stiffness.

acoustic convolver *Convolver.*

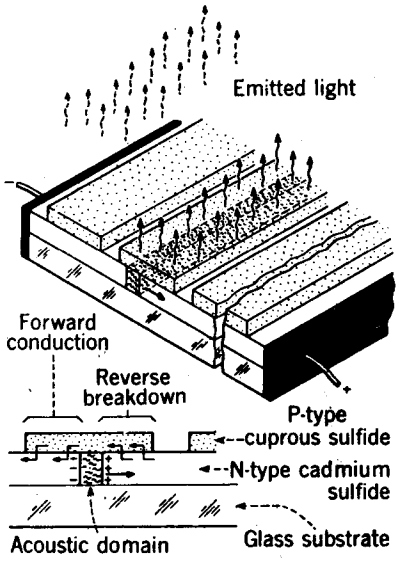
acoustic coupler A device used between the modem of a computer terminal and a standard telephone line to permit transmission of digital data in either direction without making direct connections. When the handset is placed in the coupler, a loudspeaker converts modem output pulses to sounds for the handset microphone. Similarly, a microphone in the coupler converts computer return tone data to audio signals for amplification to the correct level for the modem.

acoustic delay line A device capable of transmitting and delaying sound pulses by recirculating them in a liquid or solid medium. For computers the pulses are usually in binary form. Also called acoustic storage and sonic delay line.

acoustic depth finder *Fathometer.*

acoustic dispersion The separation of a complex sound wave into its frequency components. It is usually caused by variation of the wave velocity of the medium with frequency. The rate of change of the velocity with frequency is a measure of the dispersion.

acoustic dissipation element An element that dissipates some or all of the acoustic energy reaching it.



Acoustic domain moving from left to right in cadmium sulfide produces electroluminescent light.

acoustic domain A concentration of crystal lattice vibrations traveling at the speed of sound, used to generate light from an array of PN junctions.

acoustic Doppler effect The change heard in the frequency of a sound when there is relative motion between source and observer. The observed frequency increases as the distance decreases.

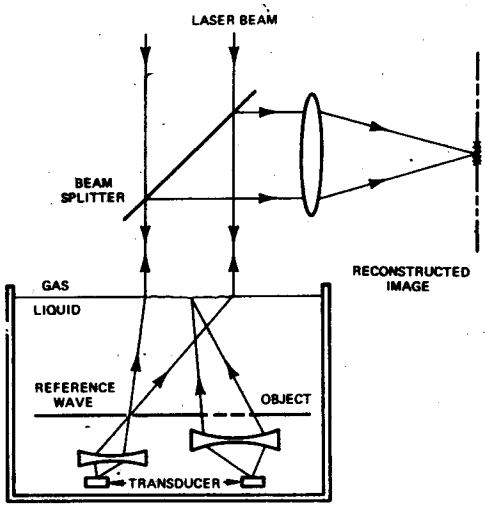
acoustic feedback The feedback of sound waves from a loudspeaker to a preceding part of an audio system, such as to the microphone, to aid or reinforce the input. When feedback is excessive, a howling sound is heard from the loudspeaker. Also called howling.

acoustic filter A sound-absorbing device that selectively suppresses certain audio frequencies.

acoustic generator A transducer that converts electric, mechanical, or other forms of energy into sound. Buzzers, headphones, and loudspeakers are examples.

acoustic hologram A three-dimensional image produced on a cathode-ray screen by using single-frequency sound waves to produce a phase interference pattern that is converted to a visible image by a laser light source and appropriate optics or by scanning microphones. Medical applications include detection of breast tumors.

acoustic holography Holography in which single-frequency sound waves are used to produce a three-dimensional image of an object in water, human flesh, or any other media capable of transmitting sound waves. The hologram is viewed on an oscilloscope or television screen.

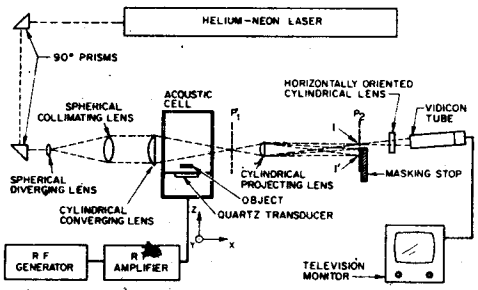


Acoustic-hologram image of underwater object is produced by laser optics from sound-diffraction pattern on liquid surface.

acoustic homing Homing on sound sources. Used in torpedoes to home on sounds made by the propellers of an enemy ship or submarine.

acoustic horn *Horn.*

acoustic imaging The production of real-time images of the internal structure of a metallic or biological object that is opaque to light. In a Bragg-diffraction version, the object is immersed in water and irradiated by plane waves of ultrasound. The



Acoustic imaging for object immersed in acoustic cell.

resulting scattered waves are used to generate a Bragg-diffracted laser beam that produces an optical image. Also called ultrasonic imaging.

acoustic impedance The sound pressure on a unit area of surface divided by the sound flux through that surface, expressed in acoustical ohms. The real component of acoustic impedance is acoustic resistance, and the imaginary component is acoustic reactance. The two types of acoustic reactance are acoustic compliance and acoustic inertance.

acoustic inertance *Acoustic mass.*

acoustic interferometer An instrument that measures the velocity of sound waves in a liquid or gas. Variations of sound pressure are observed in the medium between a sound source and a reflector as the reflector is moved or the frequency is varied. Interference between direct and reflected waves produces standing waves that are related to the velocity of sound in the medium.

acoustic intrusion detector *Acoustic burglar alarm.*

acoustic jamming Generation of sound waves that interfere with enemy ground or underwater listening or acoustic homing devices.

acoustic labyrinth A loudspeaker baffle that consists of a long absorbent-walled duct folded into the volume of a cabinet, with a loudspeaker mounted at one end. The other end is open to the air in front of or underneath the cabinet. Used to reinforce bass response and prevent cavity resonance.

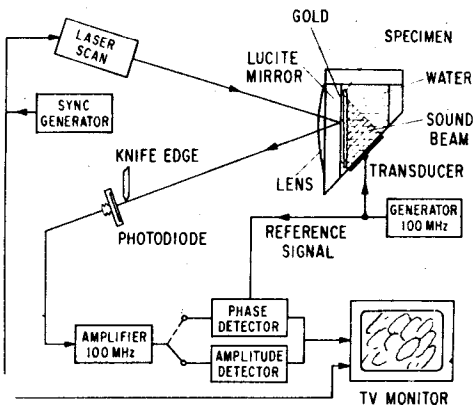
acoustic lens An array of obstacles that refracts sound waves in the same way that an optical lens refracts light waves. The dimensions of the obstacles are small compared to the wavelengths of the sounds being focused.

acoustic mass The quantity that when multiplied by 2π times the frequency gives the acoustic reactance associated with the kinetic energy of a medium. The unit is the gram per centimeter to the fourth power. Also called acoustic inertance.

acoustic memory A computer memory that uses an acoustic delay line in which a train of pulses travels through a medium like mercury or quartz.

acoustic methanometer An instrument that detects methane concentration in mines, based on the fact that sound travels much faster in methane gas than in air.

acoustic microscope A microscope that uses acoustic holography techniques to produce on a



Acoustic-microscope setup used to magnify specimen of onion skin 400 times, showing individual cells on screen of monitor.

television monitor screen a greatly magnified image of an object immersed in water.

acoustic mine An underwater mine that is detonated by sound waves, such as from a ship's propeller or engines. Also called sonic mine.

acoustic mirage The distortion of a sound wavefront by a large temperature gradient in air or water, creating the illusion of two sound sources.

acoustic mode A type of thermal vibration of a crystal lattice in which neighboring points in the lattice move almost in unison.

acoustic ocean-current meter An instrument that measures current flow in rivers and oceans by transmitting acoustic pulses in opposite directions parallel to the flow and measuring the difference in pulse travel times between transmitter-receiver pairs.

acoustic ohm *Acoustical ohm.*

acoustic pickup A pickup that transforms phonograph-record groove modulations directly into sound, as in early phonographs. The phonograph needle is mechanically linked to a flexible diaphragm. Also called sound box and mechanical reproducer.

acoustic position reference system An acoustic system used in offshore oil drilling to provide continuous information on ship position with respect to an ocean-floor acoustic beacon transmitting an ultrasonic signal to three hydrophones on the bottom of the drilling ship.

acoustic radar Use of sound waves with radar techniques for remote probing of the lower atmosphere, up to heights of about 1500 m, for measuring wind speed and direction, humidity, temperature inversions, and turbulence.

acoustic radiation pressure The steady-state unidirectional pressure exerted on a surface by a sound wave.

acoustic radiator A vibrating surface that produces sound waves, such as a loudspeaker cone and a headphone diaphragm.

acoustic radiometer An instrument that measures sound intensity by determining the unidirectional steady-state pressure caused by the reflection or absorption of a sound wave at a boundary.

acoustic reactance The imaginary component of acoustic impedance. The unit is the acoustical ohm.

acoustic reflection coefficient *Sound reflection coefficient.*

acoustic reflectivity *Sound reflection coefficient.*

acoustic refraction A bending of sound waves when they pass obliquely from one medium to another in which the velocity of sound is different, as from warm water to cool water in the ocean or from warm air to cool air.

acoustic regeneration *Acoustic feedback.*

acoustic resistance The real component of acoustic impedance. The unit is the acoustical ohm.

acoustic resonator A resonator in the form of an enclosure that exhibits resonance at a particular frequency of acoustic energy.

acoustics 1. The science that deals with the production, transmission, and effects of sound, including its absorption, reflection, refraction, diffraction, and interference. 2. The properties of a room or location which control reflections of sound waves and therefore determine the character of sounds heard in that location.

acoustic scattering The irregular and diffuse reflection, refraction, or diffraction of sound in many directions.

acoustic shock Dizziness, physical pain, and sometimes nausea produced by a sudden loud sound.

acoustic sounding 1. Use of sound waves to determine water depth, by measuring the time required for a sound pulse to travel from the surface to the bottom and back. 2. Use of sound waves to study the lower atmosphere, as with acoustic radar.

acoustic spectrograph A spectrograph used with sound waves of various frequencies to study the transmission and reflection properties of thermal layers and marine life in the ocean.

acoustic stiffness The quantity that when divided by 2π times the frequency gives the acoustic reactance associated with the potential energy of a sound medium. The unit is the dyne per centimeter to the fifth power. The reciprocal of acoustic stiffness is acoustic compliance.

acoustic storage *Acoustic delay line.*

acoustic strain gage An instrument used for measuring structural strains; it consists of a length of fine wire mounted so its tension varies with strain. The wire is plucked with an electromagnetic device, and the resulting frequency of vibration is measured to determine the amount of strain.

acoustic surface wave *Surface acoustic wave.*

acoustic surveillance Use of sound pickup, amplifying, recording, and/or transmitting equipment to obtain intelligence from enemy sound sources.

acoustic theodolite An instrument that uses sound waves to provide a continuous vertical profile of ocean currents at a specific location.

acoustic transmission coefficient *Sound transmission coefficient.*

acoustic transmission system An assembly of elements adapted for the transmission of sound.

acoustic transmittivity *Sound transmission coefficient.*

acoustic treatment The use of sound-absorbing materials to give a room a desired degree of freedom from echo and reverberation.

acoustic velocity *Velocity of sound.*

acoustic wave An elastic nonelectromagnetic wave that has a frequency which may be up into the gigahertz range. One type is a surface acoustic

wave, which travels on a surface that is an interface between two media (such as between a piezoelectric crystal and air). The other type is a bulk or volume acoustic wave, which travels through the material (as in a quartz delay line). Also called elastic wave.

acoustic-wave amplifier An amplifier in which the charge carriers in a semiconductor are coupled to an acoustic wave that is propagated in a piezoelectric material, to produce amplification.

acoustic-wave filter A filter that separates sound waves of different frequencies.

acoustic well logging Use of sound waves to determine depth and other properties of a borehole or liquid level in a well.

acoustoelectric amplifier *Acoustic amplifier.*

acoustoelectric effect The development of a DC voltage in a semiconductor or metal by an acoustic wave traveling parallel to the surface of the material. Also called electroacoustic effect.

acoustoelectronics *Pretersonics.*

acoustooptical cell An electric-to-optical transducer in which an acoustic or ultrasonic electric input signal modulates or otherwise acts on a beam of light.

acoustooptical filter An optical filter that is tuned across the visible spectrum by acoustic waves in the frequency range of 40 to 68 MHz.

acoustooptical material A material in which the refractive index or some other optical property can be changed by an acoustic wave.

acoustooptical modulator An arrangement for modulating a beam of light by passing it through an acoustic wave in a light-transparent solid or gaseous medium. The resulting amplitude modulation of the light beam is generally produced by diffraction, with the frequency of the acoustic wave determining the amount of diffraction or bending of the light beam.

acoustooptics The science that deals with interactions between acoustic waves and light.

AC power supply A power supply that provides one or more AC output voltages, such as an AC generator, dynamotor, inverter, or transformer.

acquisition The process of locating and following a radar target, satellite, or space probe, to obtain gun or missile firing data, telemetry data, or orbital information.

acquisition and tracking radar A radar set that locks onto a strong signal, tracks the object emitting the signal, and feeds position data directly and continuously to gun or missile control systems.

acquisition laser In an optical guidance system, a laser that radiates over a relatively large solid angle, such as 10°, for picking up the target during search or chase. When the target comes within range, a narrow-beam tracking laser takes over.

acquisition radar A radar set that detects an approaching target and feeds approximate position data to a fire-control or missile-guidance radar, which takes over the function of tracking the target.

AC receiver A radio receiver that operates only from an AC power line.

AC resistance *High-frequency resistance.*

acrylic resin A glasslike thermoplastic resin made by polymerizing esters of acrylic or methacrylic acid. Widely used for transparent parts. Trademark names include Lucite and Plexiglas.

AC tacho-generator An AC generator whose output voltage and output frequency are proportional to rotational speed.

actinic Pertaining to electromagnetic radiation capable of initiating photochemical reactions, as in photography or the fading of pigments. Photographic equipment for space vehicles requires protection from all such radiation, far beyond the wavelength ranges of ultraviolet and visible light.

actinides The series of heavy radioactive elements that have atomic numbers 89 through 103.

actinium [symbol Ac] A radioactive element. Atomic number is 89.

actinium series The series of nuclides that results from the decay of ^{235}U, including actinium A, B, C, C′, C″, D, K, and X. Mass numbers of all members are given by $4n + 3$, where n is an integer. The sequence is also known as the $4n + 3$ series or the actinouranium series.

actinoelectric Having photoconductivity.

actinometer An instrument that measures the intensity of radiation, such as by determining the amount of fluorescence produced by that radiation.

actinon [symbol An] The common name for 3.92s ^{219}Em, a member of the actinium series. Actinon is an isotope of radon.

actinouranium [symbol AcU] A common name for uranium isotope ^{235}U, the natural parent of the actinium series.

actinouranium series *Actinium series.*

action current A brief and very small electric current flowing in a nerve during a nervous impulse.

action potential The instantaneous value of the voltage between excited and resting portions of an excitable living structure.

action spectrum A graph of the action of incident light on a process or material, as a function of wavelength.

action spike The greatest in magnitude and briefest in duration of the characteristic negative waves in an action potential.

activated water Water that has ions, atoms, radicals, or molecules which are temporarily in a chemically reactive state because of exposure to ionizing radiation.

activation 1. The process of treating the cathode or target of an electron tube to create or increase its emission. Also called sensitization. 2. The process of inducing radioactivity by bombardment with neutrons or other types of radiation. 3. The

process of adding liquid to a manufactured cell or battery to make it operative.

activation analysis A method of chemical analysis in which the material being analyzed is bombarded with nuclear particles, and the resulting characteristic radionuclides are detected.

activation cross section The cross section for the formation of a specified radionuclide, generally by a neutron-induced reaction.

activation detector A material that measures neutron flux or neutron density by the radioactivity induced in the material as a result of neutron capture.

activation energy The excess energy required for a particular nuclear process. An example is the energy needed by an electron to reach the conduction band in a semiconductor.

activation time The time interval from the moment activation is initiated to the moment the desired operating voltage is obtained in a cell or battery.

activator 1. An impurity atom that increases the luminescence of a solid material, such as copper in zinc sulfide and thallium in potassium chloride. 2. An impurity atom used to activate the target of a camera tube. Also called sensitizer.

active 1. Contributing to signal energy, as in transistors, electron tubes, repeaters, and other amplifying devices and systems. 2. *Radioactive.*

active air defense Air defense concerned with combatant action taken to prevent or interfere with a hostile attack by aircraft or guided missiles. It includes electronic countermeasures, air-to-air guided missiles, and surface-to-air guided missiles.

active area The portion of the rectifying junction of a metallic rectifier that carries forward current.

active chaff An expendable battery-powered jammer, usually supported by parachute or balloon, dropped by aircraft to saturate enemy radars or produce delayed false returns when triggered by enemy radars.

active communication satellite A communication satellite that amplifies a received signal before transmitting it back to earth.

active component A component capable of controlling voltages or currents, to produce gain or switching action in a circuit. Examples include diodes, ferromagnetic cores, saturable reactors, electron tubes, and transistors. Also called active device and active element.

active deposit A radioactive decay product deposited on a surface.

active device *Active component.*

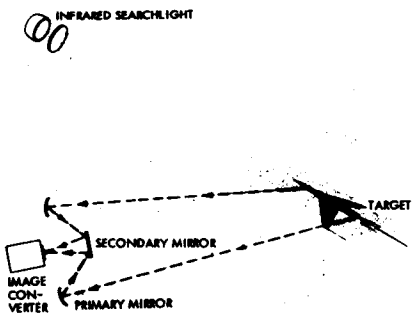
active electric network An electric network or circuit that contains one or more sources of energy.

active electronic countermeasures Electronic countermeasures that involve actions of such nature that their use in jamming or otherwise disrupting enemy radio, radar, or sonar transmissions is detectable by the enemy.

active element *Active component.*

active filter A filter that uses an amplifier with conventional passive filter elements to provide a desired fixed or tunable pass or rejection characteristic.

active homing Homing in which the missile contains both the source of energy for illuminating the target and the receiver for energy reflected from the target.



Active infrared detection system.

active infrared detection An infrared detection system in which a beam of infrared rays is transmitted toward possible targets, and rays reflected from a target are detected.

active jamming Intentional radiation or reradiation of electromagnetic energy in such a way as to impair use of a specific band of frequencies.

active line A horizontal line that carries picture information in television, as opposed to retrace lines which are blanked out during horizontal and vertical retrace.

active location A navigation system in which a navigation satellite interrogates an appropriately equipped craft, and the craft responds. When used for automated navigation, the satellite subsequently transmits position data.

active logic Logic that incorporates active components which provide such functions as level restoration, pulse shaping, pulse inversion, and power gain.

active material 1. A fluorescent material used in screens for cathode-ray tubes. Examples include calcium tungstate, zinc phosphate, and zinc silicate. 2. The lead oxide or other energy-storing material used in the plates of a storage battery. 3. Fissionable material, such as plutonium, uranium enriched in the isotope 233 or 235, and any other material capable of releasing substantial quantities of nuclear energy.

active medium A medium in which at some wavelength stimulated emission of light is more probable than absorption. The medium must have at least one quantum transition for which the higher state or energy level is more densely populated than the lower state.