

SEVENTH EDITION

M O D E R N
DICTIONARY
of
ELECTRONICS

RUDOLF F. GRAF



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**MODERN
DICTIONARY
of
ELECTRONICS**

SEVENTH EDITION

REVISED AND UPDATED



Rudolf F. Graf is an author whose name is well-known to engineers, technicians, and hobbyists around the world. He graduated as an electronics engineer from Brooklyn Polytechnic Institute and did his graduate work New York University. Mr. Graf has been active in the electronics industry for more than fifty years in capacities ranging from design and consulting engineer, chief engineer, chief instructor at electronics and television schools, and consulting editor. He also held various sales and marketing positions. Mr. Graf is the author or co-author of more than 150 technical articles published by major magazines. He has written about 50 books on electricity and electronics, with more than 2 million copies in print, including the best-selling *Video Scrambling & Descrambling for Satellite & Cable TV, Second Edition* and the *Circuits* series of books, both published by Newnes. A number of his books have been translated into several European languages as well as Chinese, Japanese, and Russian.

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Boston Oxford Auckland Johannesburg Melbourne New Delhi

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automatic direction finder—Abbreviated ADF. Also called an automatic radio compass. An electronic device, usually for marine or aviation application, which provides a radio bearing to any transmitter whose frequency is known but whose direction and location are not.

automatic electronic data-switching center—Communications center designed specifically for the automatic electronic transmission, reception, relay, and switching of digitalized data.

automatic error correction—A technique, usually requiring the use of special codes and/or automatic retransmission, that detects and corrects errors occurring in transmission. The degree of correction depends on coding and equipment configuration.

automatic exchange—A telephone exchange in which connections are made between subscribers by means of devices set in operation by the originating subscriber's instrument without the intervention of an operator.

automatic fine tuning—A circuit in a receiver that automatically maintains the correct tuner oscillator frequency and compensates for drift and for moderate amounts of inaccurate tuning. Similar to automatic frequency control.

automatic focusing—A method of electrostatically focusing a television picture tube; the focusing anode is internally connected through a resistor to the cathode and thus requires no external focusing voltage.

automatic frequency control—Abbreviated AFC. 1. A system that produces an error voltage in proportion to the amount by which an oscillator drifts away from its correct frequency, the error voltage acting to reverse the drift. 2. A control circuit in a receiver or tuner that compensates for small variations in the carrier signal frequency to provide a stable audio output. A circuit function in a tuner or receiver that keeps the unit accurately tuned to the desired station, eliminating any tendency to drift.

automatic frequency correction—See automatic frequency control.

automatic function key correction—When the wrong function key is depressed in a calculator, pressing the correct function key automatically replaces it.

automatic gain control—1. A means of controlling gain of a receiver through feedback to suit the strength of the incoming signal. Ideally, the output level at the speaker should remain constant over a wide range of input signals. For low-level inputs the feedback signal is small and gain is high. For stronger signals the feedback loop cuts gain to prevent overload. 2. A self-acting compensation device that maintains the output of a transmission system constant within narrow limits in the face of wide variations in the attenuation of the system. 3. A radar circuit that prevents saturation of the radar receiver by long blocks of received signals or by a carrier modulated at low frequency. 4. A process by which gain is automatically adjusted as a function of input or other specified parameter.

automatic gain stabilization—A circuit, used in certain identification friend-or-foe equipment and radar beacon systems, which serves to maintain optimum sensitivity in a superregenerative stage by keeping the noise-pulse load constant. The system prevents random noises from triggering the automatic transmitter associated with the receiver.

automatic grid bias—Grid-bias voltage provided by the difference in potential across a resistance (or resistances) in the grid or cathode circuit due to grid or cathode current or both.

automatic intercept—Automatic recording of messages a caller may wish to leave when the called party is away from his telephone.

automatic level compensation—A system that automatically compensates for variations in the circuit. See also automatic volume control.

automatic level control—See ALC.

automatic light control—The process by which the illumination incident on the face of a television pickup device is automatically adjusted as a function of scene brightness.

automatic message accounting—See automatic toll ticketing.

automatic message-switching center—A center in which messages are routed automatically according to information they contain.

automatic modulation control—A transmitter circuit that reduces the gain for excessively strong audio input signals without affecting the strength of normal signals, thus permitting higher average modulation without overmodulation; this is equivalent to an increase in the carrier-frequency power output.

automatic noise-limiter—A circuit that automatically clips off all noise peaks above the highest peak of the desired signal being received. This circuit prevents strong atmospheric or human-made interference from being troublesome.

automatic numbering equipment—Equipment used in association with tape transmitters to transmit a channel number.

automatic pedestal control—The process by which the pedestal height of a television signal is automatically adjusted as a function of the input or other specified parameter.

automatic phase control—A circuit used in color television receivers to synchronize the burst signal with the 3.58-MHz color oscillator.

automatic pilot—See autopilot.

automatic programming—Any technique designed to simplify the writing and execution of programs in a computer. Examples are assembly programs that translate from the programmer's symbolic language to the machine language, those which assign absolute addresses to instruction and data words, and those which integrate subroutines into the main routine.

automatic quality control—A technique in which the quality of a product being processed is evaluated in terms of a predetermined standard, and proper corrective action is taken automatically if the quality falls below the standard.

automatic radio compass—A radio direction finder that automatically rotates the loop antenna to the correct position. A bearing can then be secured from the indicator dials without mechanical adjustment or calculation. See also automatic direction finder.

automatic record changer—An electrically operated mechanism that automatically feeds, plays, and rejects a number of records in a preset sequence. It consists of a motor, turntable, pickup arm, and changer. Some changers are designed to play automatically 16 $\frac{2}{3}$ -, 33 $\frac{1}{3}$ -, 45-, and 78-rpm records.

automatic regulation—In a power supply, the automatic holding of the output voltage or current to a constant value in spite of variations in the input voltage or load resistance.

automatic relay—A means of selective switching that causes automatic equipment to record and retransmit communications.

automatic repeater station—A station that receives signals and simultaneously retransmits them, but usually on a different frequency.

automatic repeat request—Abbreviated arr. A system of error checking in which an error-detecting code

complete records, or part of a record. 8. A string of data elements that is recorded or transmitted as a unit. 9. In word processing, a selected section of characters. In data management, a group of records. In communications, a fixed batch of data that is transferred together.

block address—A method of identifying words through use of an address that specifies the format and meaning of the words in the block of information.

block cancel character—A character used to signify that the preceding portion of the block is to be disregarded. Also called block ignore character.

block code—A special code or character used to separate blocks of data. A block code is used typically on paper tape and generally occurs at both the beginning and end of a block. Thus, the information on a paper tape containing a number of blocks would be started by a block code, there would be a block code between adjacent blocks, and the data would be ended by a block code.

block diagram—1. A diagram in which the essential systems units are drawn as blocks, and their relationship to each other is indicated by appropriately connected lines. The path of the signal or energy may be indicated by lines or arrows. 2. In computer programming, a graphical representation of the data-processing procedures within the system. It is used by programmers as an aid to program development. 3. A diagram in which a system or computer program is represented by annotated boxes and interconnecting lines. Synonym: flowchart. 4. A chart that graphically depicts the functional relationships of hardware making up a system. The block diagram serves to indicate the various data and control signal paths between functional units of the system hardware. 5. A drawing in which circuit functions are represented as blocks of various geometries.

block downconversion—The process of lowering an entire band of frequencies in one step to some intermediate range to be processed by a receiver. Multiple block downconversion receivers are capable of independently selecting channels because each can process the entire block of signals.

block downconverter—1. A device that converts an entire band (e.g., the 3.7–4.2 GHz C-band) down to a lower band of frequencies. 2. A type of downconverter that changes the microwave signal into an IF frequency that contains all the transponder frequencies (channels) of the satellite. The block downconverter allows inexpensive multiple receivers to tune all the channels simultaneously using one central downconverter—an advantage when using multiple receivers with a single antenna.

blocked impedance—The input impedance of a transducer when its output is connected to a load of infinite impedance.

blocked resistance—Resistance of an audio-frequency transducer when its moving elements are restrained so they cannot move; it represents the resistance due only to electrical loss.

blockette—In digital computer programming, a subgroup, or subdivision, of a group of consecutive machine words transferred as a unit.

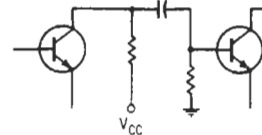
block gap—1. An area used to indicate the end of a block or record on a data medium. 2. An absence of data along a specified length of magnetic tape between adjacent blocks of data.

block-grid keying—A method of keying a continuous-wave transmitter by operating the amplifier stage as an electronic switch. During the spacing interval when the key is open, the bias on the control grid becomes highly negative and prevents the flow of plate current so that the tube has no output. During the marking interval when the key is closed, this bias is removed and full plate current flows.

block ignore character—See block cancel character.

blocking—1. Application of an extremely high-bias voltage to a transistor, vacuum tube, or metallic rectifier to prevent current from flowing in the forward direction. 2. Combining two or more records into one block. 3. A condition in a switching system in which no paths or circuits are available to complete a call, resulting in a busy tone returned to the calling party. A denial or busy condition.

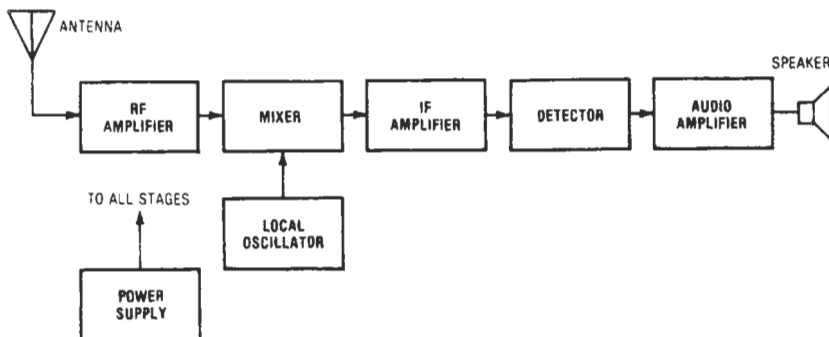
blocking capacitor—1. A capacitor that introduces a comparatively high series impedance for limiting the flow of low-frequency alternating and direct current without materially affecting the flow of high-frequency alternating current. 2. A capacitor used to block direct current while allowing an alternating current of certain frequencies to pass.



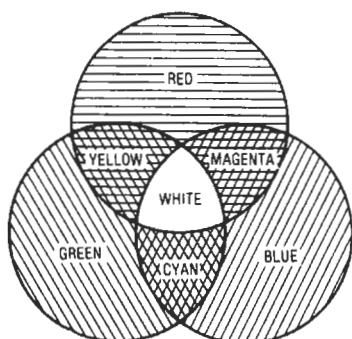
Blocking capacitor.

blocking layer—See depletion layer.

blocking oscillator—Also called squegging oscillator. 1. An electron-tube oscillator that operates intermittently as its grid bias increases during oscillation to a point



Block diagram, 1.



Chrominance primaries.

the total video signal that contains the color information. Without the chrominance signals, the received TV picture would be in black and white.

chrominance subcarrier—Also called color carrier. An rf signal that has a specific frequency of 3.579545 MHz and that is used as a carrier for the I and Q signals.

chrominance-subcarrier oscillator—In a color TV receiver, a crystal-controlled oscillator that generates the subcarrier signal for use in the chrominance demodulators.

chrominance video signals—Output voltages from the red, green, and blue sections of a color-television camera or receiver matrix.

chromium dioxide—A type of recording-tape coating that produces very good quality at low recording speeds. Because of its magnetic properties, it requires a higher value of bias current in the recorder. The high performance inherent in chromium dioxide tape can only be realized in a tape machine having provision for a CrO₂ bias setting. On a standard recorder, the chromium dioxide tape will appear to have high-frequency emphasis and may likely be difficult to erase. Chromium dioxide has a good dynamic range and a low noise level. Used in the cassette format with a suitable machine equipped with the Dolby system, it can make recordings that meet the best high-fidelity standards.

chronistor—A subminiature elapsed-time indicator that uses electroplating principles to totalize the operating time of equipment up to several thousand hours.

chronograph—An instrument for producing a graphical record of time as shown by a clock or other device.

chronoscope—An instrument for measuring very small intervals of time.

CID—Abbreviation for charge injection device or charge injection imaging device. 1. A memory in which the charge is stored in an X-Y addressable array of potential cells. For image arrays, the charge for each of the cells is generated by an associated photodiode. 2. A solid-state imaging device utilizing an image sensor composed of a two-dimensional array of coupled MOS charge-storage capacitors and designed to convert near infrared energy to electrical signals, providing broad gray shade or tonal rendition. The sensor collects minority carrier charge, generated by photon energy in the substrate near the charge-storage capacitors, and stores it in the surface inversion region. By injecting the stored charge into the substrate, and by monitoring the current, signal readout is achieved.

CIE—Initials of the Commission Internationale de l'Éclairage, or International Commission on Illumination.

CIE source—Standard light source representative of the quality of specified natural or artificial illumination.

CIE standard chromaticity diagram—A chromaticity diagram in which the X and Y chromaticity coordinates are plotted in rectangular coordinates.

CIM—Abbreviation for computer-integrated manufacturing. Applying information technology to production processes and organizational structure to streamline operations. Often focused on integrating systems and processes distributed across a company, such as order entry, scheduling, and production.

cinching—Longitudinal slippage between the layers in a tape pack as a result of acceleration or deceleration of the roll.

cipher—Cryptographic system in which arbitrary symbols or groups of symbols represent units of plain text of regular length, usually single letters, or in which units of plain text are rearranged, or both, according to certain predetermined rules.

cipher machine—Mechanical and/or electrical apparatus for enciphering and deciphering.

cipher telephony—A technique by which mechanical and/or electrical equipment is used for scrambling or unscrambling, or enciphering or decoding, radio or voice messages.

ciphertext or cryptogram—A secret form of a message.

ciphony—See cipher telephony.

circle cutter—A tool consisting of a center drill with an adjustable extension-arm cutter, used to cut holes in panels and chassis.

circle-dot mode—A method of storage of binary digits in a cathode-ray tube in which one kind of digit is represented by a small circle on the screen, and the other kind is represented by a similar circle with a concentric dot.

circle of confusion—The circular image of a point source due to the inherent aberrations in an optical system.

circlotron amplifier—A one-port, nonlinear cross-field high-power microwave amplifier that uses a magnetron as a negative-resistance element, much as a maser uses an active material.

circuit—1. Path through which electrical signals flow. 2. An electronic path between two or more points capable of providing a number of channels. 3. A number of conductors connected together for the purpose of carrying an electrical current. 4. The interconnection of a number of devices in one or more closed paths to perform a desired electrical or electronic function. Examples of simple circuits are high- or low-pass filters, multivibrators, oscillators, and amplifiers. 5. A complete path of electron flow from a negative terminal of voltage source through a conductor and back to the positive terminal. 6. An electrical system using two or more wires in which the current flows from the source to one or more electrical devices and back again to the source of supply. 7. A complete, closed path. Confusion between circuit and network is common. *Circuit* refers to a closed path within a network. 8. An array of elements interconnected to perform functions beyond the range of single-element capability. See channel, 2.

circuit analysis—Careful determination of the nature and behavior of a circuit and its various parts. The analysis may be theoretical, practical, or both.

circuit analyzer—Also called multimeter. Several instruments or instrument circuits combined in a single enclosure and used in measuring two or more electrical quantities in a circuit.

circuit bonding jumper—The connection between portions of a conductor in a circuit to maintain required ampacity of the circuit.

circuit breaker—1. An automatic device that, under abnormal conditions, will open a current-carrying circuit

usually be neglected. 4. A material of low electrical conductivity designed for supporting a conductor, physically and electrically separating it from another conductor or object.

insulator arcing ring—A circular or oval metal part placed at one or both ends of an insulator to prevent current from arcing over and damaging it and/or the conductor.

insulator arcover—The flow of power current over an insulator in the form of an arc following a surface discharge.

insulating—See surface insulation.

insulelectrics—The science encompassing insulating materials in electrical insulation.

integer—A whole number, which may be positive, negative, or zero. It does not have a fractional part. Examples of integers: 1, 2, 48, -136, etc., but not 3.7 or $3\frac{1}{4}$.

integral-cavity, reflex-klystron oscillator—A reflex-klystron oscillator in which tuning is accomplished by changing the physical dimensions of the resonant cavity. It is usually referred to as a diaphragm- or grid-gap-tuned klystron, since a flexible diaphragm is used to change the cavity dimension, i.e., the gap between the cavity grids.

integral circuit packages—Microcircuits assembled from discrete components and all circuits created essentially in an active or passive substrate.

integral contact—Current-carrying member of jack, switch, or relay. Usually a flat, flexible spring or other conducting member having no separate contacts attached at point of mating.

integral-external-cavity reflex oscillator—A reflex-klystron oscillator in which a fixed internal cavity is tightly coupled to a permanently attached external cavity. Tuning is achieved by varying a reactance probe in the external cavity.

integral-horsepower motor—A motor that is built into a frame and has a continuous rating of 1 horsepower.

integral resistor—An internal or external resistor preconnected to the electrical element and forming an integral part of the cup assembly to provide a desired electrical characteristic of a precision potentiometer.

integrated—A type of design in which two or more basic components or functions are physically, as well as electrically, combined—usually on one chassis, such as an integrated amplifier.

integrated amplifier—Also called, occasionally, a control amplifier, since it is an amplifier with controls. 1. An amplifier that embodies in a common housing the preamplifier and control section and the power amplifier. Some early amplifiers of large power were in two separate units, one the control unit with preamplifiers and the other the power amplifier. 2. A single component combining the functions and circuitry of a power amplifier and preamplifier. See also amplifier.

integrated circuit—Abbreviated IC. Also called functional device. 1. An electrical network—active or passive—composed of two or more circuit elements inextricably bound on a single semiconductor substrate. To further define the nature of an integrated circuit, additional modifiers may be prefixed. Examples: dielectric-isolated monolithic integrated circuit, beam-lead monolithic integrated circuit, or silicon-chip tantalum thin-film hybrid integrated circuit. See also film integrated circuit; hybrid integrated circuit; monolithic integrated circuit; multichip integrated circuit. 2. Any electronic device in which both active and passive elements are contained in a single package. The term frequently is used for circuits other than those containing semiconductors; for example, microwave

insulator arcing ring — integrated morphology

designers consider many types of waveguide assemblies to be integrated circuits. 3. A small chip of solid material (generally a semiconductor) upon which, by various techniques, an array of active and/or passive components has been fabricated and interconnected to form a functioning circuit. Integrated circuits, which are generally encapsulated with only input, output, power supply, and control terminals accessible, offer great advantages in terms of small size, economy, and reliability. 4. The physical realization of a number of electrical circuit elements inseparably associated on or within a continuous body of semiconductor material to perform the function of a circuit. 5. An electronic device containing several elements, active or passive, that perform all or part of a circuit function. 6. An interconnected array of conventional components—transistors, diodes, capacitors, and resistors—fabricated *in situ* within and on a single crystal of semiconductor material with the capability of performing a complete electronic circuit function. 7. An electronic circuit containing transistors, diodes, resistors, and perhaps capacitors and photocells, along with interconnecting electrical conductors processed and contained entirely within a single chip of silicon. 8. Multiple, interconnected circuit elements, contained on or in a common substrate, that function as a unit and not separately.

integrated-circuit array—Multiple integrated circuits formed on a common substrate and electrically interconnected during fabrication.

integrated-circuit package—The combined mounting and housing for an integrated circuit; the package protects the integrated circuit and permits external connections to be made to it.

integrated communication system—Communication system on either a unilateral or joint basis in which a message can be filed at any communications center in that system and be delivered to the addressee(s) by any other appropriate communication center in that system without reprocessing en route.

integrated component—A number of electrical elements comprising a single structure that cannot be divided without destroying its stated electronic function.

integrated console—Computer control console that is capable of controlling the operation of the switching center equipment of an integrated communications system.

integrated data processing—A method of transforming disjointed and repetitive paperwork tasks into a correlated and mechanized production of information for any purpose.

integrated electronic component—Abbreviated IEC. An assembly that consists of several integrated circuits interconnected on a single chip of silicon to provide a complete electronic function with a circuit content greater than 10 equivalent gates.

integrated electronics—That portion of electronic art and technology in which the interdependence of material, device, circuit, and system-design considerations is especially significant; more specifically, that portion of the art dealing with integrated circuits.

integrated electronic system—See integrated circuit.

integrated equipment components—Abbreviated IECs. Integrated-circuit chips that contain a complete logic function.

integrated injection logic—See I²L.

integrated microcircuit—See integrated circuit.

integrated morphology—The structural characterization of an electronic component in which the identity of the current- or signal-modifying areas, patterns, or volumes has become lost in the integration of electronic

mixed analog component (MAC) transmissions—An innovative television transmission method that separates the data, chrominance, and luminance components and compresses them for sequential relay over one television scanline. There are presently five systems being designed: A-MAC; B-MAC; C-MAC; D-MAC; and E-MAC.

mixed-base notation—A number system in which a single base, such as 10 in the decimal system, is replaced by two number bases, such as 2 and 5, used alternately.

mixed calculation—In a calculator, calculation involving more than one arithmetic mode. Saves time by permitting calculations to be handled as a single problem.

mixed dielectric capacitor—Also called bifilm capacitor. A capacitor with a dielectric consisting of a combination of plastic film and paper.

mixed highs—In color television, the method of reproducing very fine picture detail by transmitting high-frequency components as part of the luminance signal for achromatic reproduction.

mixer—1. In a sound transmission, recording, or reproducing system, a device having two or more inputs (usually adjustable) and a common output. The device combines the separate input signals linearly in the desired proportion to produce an output signal. 2. A circuit that generates output frequencies equal to the sum and difference of two input frequencies. 3. A device for blending two or more signals for special effects. 4. An audio control unit whose basic function is to combine two or more audio signals into a single, composite signal.

mixer diode—A diode, often associated with microwave circuits, that combines rf signals at two frequencies to generate an rf signal at a third frequency.

mixer ports—The input/output terminals of a mixer, identified as RF, LO, and IF. In most double balanced mixers, the LO and RF are either transformer or transmission line-coupled to the mixer diodes, and therefore have a limited low-frequency response, whereas the IF port is usually direct-coupled with an essentially unlimited low frequency response. In upconverting applications, the low frequency input signal is often applied to the IF port, with the higher-frequency output signal being taken from the RF port.

mixer tube—An electron tube that, when supplied with voltage or power from an external oscillator, performs the frequency-conversion function of a heterodyne conversion transducer.

mixing—1. Combining two or more signals—e.g., the outputs of several microphones, or the received and local-oscillator signals in a superheterodyne receiver. 2. Blending of two or more signals for special effects, while exercising individual control over the volume of each. 3. Generating output frequencies that are the sum and difference of two input frequencies.

mixing amplifier—An amplifier that combines several signals, each with a different amplitude and wave-shape, into a composite signal.

mixing point—In a block diagram of a feedback control loop, a symbol indicating that the output is a function of the inputs at any instant.

mksa—Meter-kilogram-second-ampere.

mksa electromagnetic system of units—Also called the Giorgi system. A system in which the fundamental units are the meter, kilogram, second, and ampere.

MLM—See multilayer metallization.

MLS—Abbreviation for microwave landing system. A microwave system that creates a fan-shaped beam over a wide volume of airspace so planes can use various approaches to a runway during bad weather.

mm—Letter symbol for millimeter.

mmf or mmfd—Abbreviation for micromicrofarad; this term is obsolete and has been replaced by picofarad.

mm Hg—Millimeters of mercury. A measure of absolute pressure, being the height of a column of mercury that the air or other gas will support. Standard atmospheric pressure will support a mercury column 760 millimeters high (760 mm Hg). Any value less than this represents some degree of vacuum.

MMIC—Abbreviation for monolithic microwave integrated circuit. A combination of active elements (diodes and transistors) and passive elements (resistors, capacitors, inductors, and transmission lines) on a single GaAs (gallium arsenide) substrate. MMICs replace conventional "chip and wire" microwave circuits. As amplifiers, attenuators, or switches at microwave frequencies, MMICs offer benefits of reduced size, lower unit cost, and higher reliability. An integrated circuit design.

mnemonic—1. A term describing something used to assist the human memory. 2. A method of expressing complicated words, names, or phrases so as to render them easy to remember, usually by using the first letter or letters of each major syllable of the original. 3. The art of improving the efficiency of the memory (in computer storage). Abbreviation of instructions used in computer language programming. 4. An abbreviation or word that stands for another word or phrase.

mnemonic code—1. Computer instructions written in a form the programmer can remember easily, but which must be converted into machine language later. 2. A memory jogger. 3. Computer instructions written in brief, easy-to-learn, symbolic or abbreviated form. Mnemonic code is also recognizable by the assembly program. For example, ADD, SUB, CLR, and MOV are mnemonic codes for instructions that will be executed as machine code.

mnemonic language—A programming language that is based on easily remembered symbols and that can be assembled into machine language by the computer.

mnemonic operation codes—Computer instructions that are written in a meaningful notation, for example: ADD, MPY, STO.

mnemonic symbol—A symbol chosen so that it assists the human memory; for example, the abbreviation MPY used for "multiply."

MNOS—Abbreviation for metal-nitride-oxide semiconductor.

mobile operation—Radiocommunication conducted while in motion or during halts at unspecified locations.

mobile radio service—Radio service between a fixed location and one or more mobile radio stations, or between mobile stations.

mobile radiotelephone—System providing telephone service to a station located in a mobile vehicle, using radio circuits to a base station that is connected to a central telephone office.

mobile receiver—The radio receiver in an automobile, truck, or other vehicle.

mobile-relay station—A type of base station in which the base-station receiver automatically turns on the base-station transmitter that then retransmits all signals received by the base-station receiver. Such a station is used to extend the range of mobile units and requires two frequencies for operation.

mobile service—A radiocommunication service between mobile and fixed stations, or between mobile stations. Depending on whether one or more of the earth stations are on land, sea, or air, the service is called land mobile, maritime mobile, or aeronautical mobile.

beta particles that strike a phosphor. Two photocells then convert the light output from the phosphor into electrical energy.

prompt—1. A symbol that alerts the user that a device is online and connected to a channel for transmission. 2. Information sent to a PC from the remote computer requesting more input. 3. An on-screen hint to the user about what to do next.

prong—See pin.

proof pressure—1. The maximum pressure that may be applied to the sensing element of a transducer without changing the transducer performance beyond specified tolerances. 2. The maximum pressure that a diaphragm, capsule, or element can withstand without permanent deformation. Expressed in terms of input pressure.

propagated error—An error that is carried through succeeding computer operations.

propagation—Also called wave propagation. 1. The travel of electromagnetic waves or sound waves through a medium. Propagation does not refer to the flow of current in the ordinary sense. 2. The means by which radio signals are carried from one location to another.

propagation anomaly—An irregularity introduced into an electromagnetic or other sensing device by discontinuities in the propagation medium.

propagation constant—1. The transmission characteristic that indicates the effect of a line on a wave being transmitted along the line. It is a complex quantity having a real term called the attenuation constant and an imaginary term called the phase constant. 2. Also called transfer factor. The natural logarithm of the ratio of the current into an electric transducer to the current out of the transducer, with the transducer terminated in its iterative impedance.

propagation delay—1. A measure of the time required for a logic signal to travel through a device or a series of devices forming a logic string. It occurs as the result of four types of circuit delays—storage, rise, fall, and turn-on delay—and is the time between when the input signal crosses the threshold-voltage point and when the responding voltage at the output crosses the same voltage point. 2. Time delay occurring between the application of an input to a digital logic circuit and the change of state at the output. 3. The time necessary for a signal to travel from one point in a circuit to another. 4. The time required for a pulse or a level transition to propagate through a device. 5. See insertion delay.

propagation error—For ranging systems, the algebraic sum of propagation-velocity error and curved-path error. Except at long ranges and low angles, the curved-path component of propagation error is generally negligible.

propagation factor—See propagation ratio.

propagation loss—The loss of energy suffered by a signal while passing between two points.

propagation ratio—Also called the propagation factor. For a wave that has been propagated from one point to another, the ratio of the complex electric-field strength at the second point to that at the first point.

propagation time—1. The time it takes for a signal to travel from point to point. In a communications channel, the velocity of signal propagation is less than that of radio. A signal delay of 20 ms per thousand miles or 1600 kilometers is a reasonable maximum. 2. The time required for transmission of a unit of binary information (high or low voltage) from one physical point in a system or subsystem to another, such as from the input to the output of a device.

propagation time delay—The time required for a wave to travel from one point to another along a transmission line. It varies according to the type of line.

propagation velocity—See velocity of propagation.

property sort—In a computer, a technique for the selection of records meeting a certain criterion from a file.

proportional—1. A linear (straight line) relationship between two variables. 2. Method of printing characters in which each character takes up only the horizontal space it needs, rather than a fixed amount of space, e.g., the character "i" takes up less space than "m."

proportional band—The range of the controlled variable corresponding to the full range of operation of the final control element.

proportional control—1. A method of control in which the intensity of action varies linearly as the condition being regulated deviates from the conditions prescribed. 2. Also called galloping ghost. An advanced type of radio-control system in which the rudder (and sometimes the elevator) can move as much (or as little) as the operator wishes. 3. A control system in which corrective action is always proportionate to any variation of the controlled process from its desired value. For example, instead of snapping directly open-closed in the manner of two-position control, a proportional valve will be always positioned at some point between open and closed, depending on the flow requirement of the system at any given moment.

proportional counter tube—A sealed tube containing an inert gas such as argon, krypton, xenon, methyl bromide, etc. It is used like a Geiger-Mueller counter and operated at about 100 volts in the proportional region.

proportional linearity—A manner of expressing nonlinearity as the deviation from a straight line in terms of a given percentage of the transducer output at the stimulus point under consideration (i.e., as a percentage of the reading).

proportional region—In a radiation counter tube, the applied-voltage range in which the gas amplification is greater than unity and is independent of the charge liberated by the initial ionizing event.

proportional temperature control—A method of stabilizing (an oscillator) by providing heater power that is directly proportional to the difference between the desired operating temperature and the ambient temperature.

proprietary alarm system—An alarm system that is similar to a central station alarm system except that the annunciator is located in a constantly manned guard room maintained by the owner for his or her own internal security operations. The guards monitor the system and respond to all alarm signals or alert local law enforcement agencies, or both.

protected area—An area monitored by an alarm system or guards, or enclosed by a suitable barrier.

protected location—A computer storage location reserved for special purposes, in which data cannot be stored without being subjected to a screening procedure to establish suitability for storage at that location.

protected memory—Storage (memory) locations reserved for special purposes, in which data cannot be entered directly by the user.

protected port—A point of entry, such as a door, window, or corridor, that is monitored by sensors connected to an alarm system.

protected wireline distribution system—Also known as approved circuit. A communications system to which electromagnetic and physical safeguards have been applied to permit secure electrical transmission of unencrypted, classified information, and that has been approved by the cognizant department or agency. The

transaction processing—A processing method in which transactions are executed immediately after they are received by the computer. The largest single application for fault-tolerant computers, which involves repetitive, typically financial, tasks in banking, stock trading, and the like.

transadmittance—From one electrode to another, the alternating components of the current of the second electrode divided by the alternating component of the voltage of the first electrode, all other electrode voltages being maintained constant. As most precisely used, the term refers to infinitesimal amplitudes.

transceiver—The combination of radio transmitting and receiving equipment in a common housing, usually for portable or mobile use and employing some common circuit components for both transmitting and receiving.

transceiving data link—Integrated data processing by means of punched cards, using transceivers as terminal equipment. The transmission path can be wire or radio.

transconductance—Symbolized g_m . Also called mutual conductance. An electron-tube rating equal to the change in anode current divided by the change in grid voltage causing the anode-current change. The unit of transconductance is the siemens; a more commonly used unit is the microsiemens (10^{-6} siemens).

transconductance amplifier—An amplifier that supplies an output current proportional to its input voltage. From its output terminals the amplifier appears to be a current source with a high output impedance Z_o . Its input impedance $Z_{in} \gg Z_g$, and the output impedance $Z_o \gg Z_L$, where Z_g and Z_L are the source and load impedances.

transconductance meter—Also called a mutual-conductance meter. An instrument for indicating the transconductance of a grid-controlled electron tube.

transconductance tube tester—Also called a mutual-conductance or dynamic mutual-conductance tube tester. A tube tester with circuits set up in such a manner that the test is made by applying an ac signal of known voltage to the control grid, and the tube amplification factor or mutual conductance is measured under dynamic operating conditions.

transconductor—An active or passive network whose short-circuit output current is a specific, accurately known, linear or nonlinear function of the input voltage, thereby establishing a predetermined relationship between input voltage and output current.

transcribe—1. To copy, with or without translating, from one external storage medium of a computer to another. 2. To copy from a computer into a storage medium or vice versa.

transcriber—Equipment associated with a computing machine for the purpose of transferring input or output data from a record of information in a given language to the medium and language used by a digital computing machine, or from a computing machine to a record of information.

transcription—1. An electrical recording (e.g., a high-fidelity, 33 $\frac{1}{3}$ -rpm record) containing part or all of a (radio) program. It may be either an instantaneous recording disc or a pressing. 2. A phonograph record, especially the 33 $\frac{1}{3}$ -rpm 16-inch (40.6-cm) record, used to record broadcast programs.

transdiode—A transistor so connected that the base and collector are actively maintained at equal potentials, although not connected together. The logarithmic transfer relationship between collector current and base-emitter voltage very closely approximates that of an ideal diode.

transducer—1. A device that when actuated by signals from one or more systems or media can supply related signals to one or more other systems or media.

2. A device, component, machine, system, or combination of these that converts energy from one form to another. The energy may be in any form, such as electrical, mechanical, acoustical, etc. The term transducer is often restricted to a device in which the magnitude of an applied stimulus is converted into an electrical signal proportional to the quantity of the stimulus. 3. A device used to convert physical parameters, such as temperature, pressure, or weight, into electrical signals. 4. A device that converts information from one physical form to another. Examples include the phono cartridge (mechanical to electrical), speaker (electrical to acoustical), and microphone (acoustical to electrical). 5. A force-measuring device. It has the characteristics of providing an output, usually electrical, that serves as the measurement of load, force, compression, pressure, etc., when placed along the sensitive axis of the force cell. 6. An electromechanical device for translating a physical quantity such as pressure, temperature, displacement, acceleration, etc., into a proportional electrical quantity, such as voltage or current. 7. A device that converts something measurable into another form; often, a physical property such as temperature or flow into an electrical signal. Frequently used interchangeably with *sensor*.

transducer-coupling system efficiency—The power output at the point of application, divided by the electrical power input into the transducer.

transducer efficiency—Ratio of the power output to the electrical power input at the rated power.

transducer equivalent noise pressure (of an electroacoustic transducer or system used for sound reception)—Also called equivalent noise pressure. For a sinusoidal plane-progressive wave, the rms sound pressure that, if propagated parallel to the principal axis of the transducer, would produce an open-circuit signal voltage equal to the rms of the inherent open-circuit noise voltage of the transducer in a transmission band having a bandwidth of 1 hertz and centered on the frequency of the plane sound wave.

transducer gain—Ratio of the power that the transducer delivers to the load under specified operating conditions to the available power of the source.

transducer insertion loss—See insertion loss.

transducer loss—Ratio of the available power of the source to the power that the transducer delivers to the load under specified operating conditions.

transducer pulse delay—The interval of time between a specified point on the input pulse and on its related output pulse.

transfer—1. To transmit, or copy, information from one device to another. 2. To jump. 3. The act of transferring. 4. In electrostatography, the act of moving a developed image, or a portion thereof, from one surface to another without altering its geometrical configuration (e.g., by electrostatic forces or by contact with an adhesive-coated surface). 5. In a computer, to terminate one sequence of instructions and start another.

transfer accuracy—The input-to-output error as a percentage of the input. Transfer accuracy depends on the source impedance, switch resistance, load impedance if the multiplexer is not buffered, and the signal frequency.

transfer admittance—1. The complex ratio of the current at the second pair of terminals of an electrical transducer to the electromotive force applied between the first pair, all pairs of terminals being terminated in any specified manner. 2. The reciprocal of transfer impedance.

transfer characteristic—1. The relationship, usually shown by a graph, between the voltage of one electrode and the current to another electrode, all other electrode voltages being maintained constant. 2. The characteristics pertaining to the degree of output activity for an input stimulus, or vice versa. 3. Function that when