

SEVENTH EDITION

M O D E R N
DICTIONARY
of
ELECTRONICS

RUDOLF F. GRAF



**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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*It gives me great pleasure to dedicate this edition to
Allison, Sheryl, Daniel, David, Russell and Scott,
the loveliest children this side of heaven.*

Preface

When the first edition of this dictionary was published in 1961, today's everyday items like color TVs, VCRs, CD players, computers, FAX machines, ATMs, cordless and cell phones, pagers, tape recorders, digital watches, pocket calculators, lasers, and many others too numerous to mention, were non-existent or mere laboratory curiosities. Since then, electronics has undergone significant changes based primarily on the meteoric expansion of integrated circuits and their apparently limitless applications. Vacuum tubes were replaced by semiconductors, and numerous technologies like ferrite core or bubble memories were relegated to the electronics graveyard. No other industry has ever grown so much and matured so fast, paced by technological advances that occur at a feverish pace. The first edition of this dictionary contained about 10,000 definitions of then current terms. And now, a scant 38 years later, this seventh edition contains approximately 25,000 terms—a clear indication of the phenomenal growth of our industry.

As technologies evolve and fresh products and concepts are introduced, suitable terminology must be developed to be able to communicate. The originators of the new words give them their initial meaning, but their exact definitions change with technological advances and through actual use by others. The contents of this dictionary is thus an analysis of words and their meanings as determined by common usage, written in a modern and popular style to provide clear and concise explanations of each entry. Continual updating of a work such as this is vital, so that those involved in the world of electronics have the power to communicate with those about them and to grasp new concepts as they emerge.

All entries are allowed as much space as is necessary for complete and meaningful definitions. Terms are explained clearly and precisely without excessive technical jargon. Original entries from the previous edition have been reviewed and many were revised to keep pace with current usage. Where more than one definition exists for a term, they are arranged numerically. This method, however, does not necessarily imply a preferred order of meanings. Important words from formative technologies that are no longer in use are retained in this edition for their historical interest.

My thanks go out to Ms. Tara Troxler Thomas and to Charles Thomas whose dedication to this project and skill at the word processor made it possible to deliver the manuscript for this work to the publisher in a timely fashion.

Industry and technical sources—notably the IEEE and the ASA—generously aided in defining many terms during the preparation of earlier editions of this work.

While this volume is as up-to-date as possible at the time of writing, the field of electronics is expanding so rapidly that new terms are constantly being developed and older terms take on broader or more specialized meanings. It is the intention of the publisher to periodically issue revised editions of this dictionary; thus suggestions for new terms and definitions are always welcome.

Rudolf F. Graf
February 1999

S

s—Letter symbol for second.

S—Symbol for secondary and source electrode.

SA—Abbreviation for signature analysis.

sabin—Also known as square-foot unit of absorption. A measure of the sound absorption of a surface. It is equivalent to 1 square foot of a perfectly absorptive surface. *See also* equivalent absorption.

saddle—Insulation placed under a splice in a coil lead.

safe operating area—Abbreviated SOA. The limit range in which a semiconductor device can be operated without damage. Boundaries of this area are maximum voltage, maximum current, and the secondary breakdown region.

safety—The conservation of human life and its effectiveness, and the prevention of damage to items, consistent with mission requirements.

safety factor—The amount by which the normal operating rating of a device can be exceeded without causing failure of the device.

safety service—A radiocommunication service used permanently or temporarily for the safeguarding of human life and property.

SAGE system—*See* Semiautomatic Ground Environment.

SAG MOS—Abbreviation for self-aligning-gate MOS.

St. Elmo's fire—A visible electric discharge sometimes seen at the tips of aircraft propellers or wings, the mast of a ship, or any other metal point where there is considerable atmospheric difference of potential due to concentration of the electric field at the points of the conductor.

sal-ammoniac cell—A cell in which the electrolyte consists primarily of a solution of ammonium chloride.

salient pole—1. A pole consisting of a separate radial projection having its own iron pole piece and its own field coil, used in the field system of a generator or motor. 2. In an electric motor or generator, a magnetic field pole projecting toward the armature.

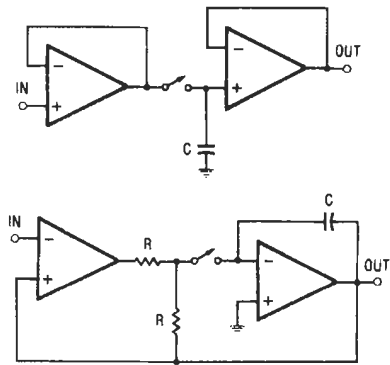
Salisbury darkbox—An isolating chamber used for test work in connection with radar equipment. The walls of the chamber are specially constructed to absorb all impinging microwave energy at a certain frequency.

Sallen-Key filter—A design technique that utilizes both positive and negative feedback to achieve single-amplifier realizations of multiple low-pass, high-pass, and bandpass responses.

SAM—Acronym for sequential access memory.

sample—1. One or more units of product drawn from a lot, the units being selected at random without regard to their quality. 2. An instantaneous value of a variable obtained at regular intervals. 3. To obtain sample values of a complex wave at periodic intervals.

sample and hold—1. A circuit used in an analog-to-digital converter whenever it is desirable to make a measurement of a signal and to know precisely when the input signal corresponds to the results of the measurement. It is also used to increase the duration of the signal. 2. A system in which a sample of an analog input signal is frozen in time (is stored in a capacitor) and held while it is converted to a digital representation or otherwise processed. 3. A circuit that holds, or freezes, a changing analog input signal voltage. Usually, the voltage thus frozen is then converted into another form, either by a voltage-controlled oscillator, an analog-to-digital converter, or some other device. 4. To capture and retain a signal so it may be converted by an analog-to-digital converter.



Sample-and-hold circuits.

sample-and-hold amplifier—1. An analog circuit element that is the analog equivalent of the digital latch. Used to sample an analog signal and then hold it steady at a particular point so that a voltage of interest may be measured or used elsewhere in a system. The most common use of sample-and-hold devices is to sample and hold an analog signal at a particular point while it is measured with an analog-to-digital converter. 2. Analog amplifier, usually with a gain of 1, that has two modes of operation. In the sample mode the output follows the input; in the hold mode the output retains the input value present when the amplifier mode was switched from sample to hold by control logic.

sampled date—Data in which the information content is determined only at discrete time intervals. Sampled data may be either analog or digital in form.

sample pulse—*See* strobe pulse, 1.

sampler—1. A directional coupler that has a detector attached to the auxiliary arm so that a video output sample proportional to the input power level is obtained. When the sampler is used to monitor power or drive a closed-loop source leveling system, the directional coupler must have a flat coupling coefficient. 2. *See* sampling circuit.

sample rate—1. The rate at which the analog sample is measured and/or displayed per second. 2. The rate at which samples are taken in the analog-to-digital conversion process.

sample-to-hold offset error—In a sample-and-hold circuit, the difference in output voltage between the time the switch starts to open and the time when the output has settled completely. It is caused by charge being transferred to the hold capacitor from the switch as it opens.

sampling—1. To obtain values of a function that correspond to discrete, regularly or irregularly spaced values of the independent variable. 2. In pulse-code modulation, selecting samples of an analog wave at recurring intervals so that the original wave can later be reconstructed with reasonable fidelity from the samples. 3. Measuring an input value at intervals.

sampling circuit—Also called a sampler. A circuit whose output is a series of discrete values representative of the values of the input at a series of points in time.

sampling distribution—In random-sampling oscilloscope technique, a function that describes the manner in which the density of a large number of randomly placed samples varies across the signal period.

sampling gate—A device that must be activated by a selector pulse before it will extract information from the input waveform.

sampling oscilloscope—An oscilloscope technique very similar in principle to the use of stroboscopic light to study fast mechanical motion or other very high frequency occurrences. Progressive samples of adjacent portions of successive waveforms are taken; then they are "stretched" in time, amplified by relatively low-bandwidth amplifiers, and finally shown, one sample at a time, on the screen of a cathode-ray tube. The graph produced is a replica of the sampled waveforms. The principal difference in appearance between displays made by sampling techniques and conventional displays is that those made by sampling comprise separate segments or dots. This technique is limited to depicting repetitive signals, since no more than one sample is taken and displayed each time the signal occurs, and provides a means for examining fast-changing signals of low amplitude that cannot be examined in any other way.

sampling plan—A program for the acceptance or rejection of a lot based on tests or inspections indicating the quality of predetermined sample sizes.

sampling rate—The number of times that a particular data channel is sampled by a commutator in one second.

sampling theorem—A theorem (developed by Nyquist in 1928) which states that two samples per cycle will completely characterize a band-limited signal; that is, the sampling rate must be twice the highest-frequency component. (In practice, the sampling rate is ordinarily from five to ten times the highest frequency.)

sand load—An attenuator used as a terminating section on a transmission line to dissipate power. The space between inner and outer conductors is filled with a sand and carbon mixture that acts as the dissipative element.

sandwich—A packaging method in which components are placed between boards or layers.

sanitary motor—A type of motor used in the food industry. It usually has a frame that is so shaped that

deposits of material cannot collect to contaminate nearby food, and can be easily kept clean.

SAP—An acronym for second audio program. Transmitted in FM at a bandwidth of only 10 kHz, this is generally used for dual-language purposes or other audio.

sapphire—A gem used on the tip of quality phonograph needles and also for bearings in precision instruments.

sapphire substrates—Materials that provide a uniform dielectric constant, controlled orientation, thermal conductivity, and the single crystal surface desired for SOS, hybrid IC, and other microcircuit systems. The material may be grown directly in ribbons, tubes, filaments, and sheets.

SARAH—Acronym for search and rescue and homing. A radio homing device, originally designed for personnel rescue, used in operations for the recovery of spacecraft at sea.

SATCOM—The name of satellites built by RCA Astro-Electronics and operated by RCA Americom. They distribute programming to cable TV systems and provide network radio transmissions, as well as commercial and government voice, data, and video services.

SATCOM F1—Also referred to as just F1. American TV satellite (operated by RCA) to supply most of cable TV programming on 24 transponders (12 are vertically and 12 are horizontally polarized). It is located at 135° west longitude.

SATCOM F2—Also referred to as F2. American TV satellite (operated by RCA) to supply assorted video and data programming to Alaska and other points in the United States. Like its sister, F1, it has 24 transponders. It is located at 119° west longitude.

satellite—1. Orbiting system in space that receives communications radio signals from ground bases on earth and then retransmits them to distant locations. 2. A TV station licensed to rebroadcast the programming of a parent station. It differs from a translator in that satellite power limits are much higher, and satellites may also originate some programming. *See* figure on p. 664.

satellite communication systems—A remote communications technique using a satellite in orbit to receive signals from one location and then retransmit them to another location.

satellite receiver—1. The electronic component of an earth station used indoors that downconverts, processes, and prepares satellite signals for viewing or listening. 2. A component used for tuning in a selected satellite transponder. It may contain one or two downconverters, or none. The receiver recovers the original baseband signals and delivers them to a remodulator. The receiver can also supply the dc operating voltages for an external LNA and downconverter.

SATO—Abbreviation for self-aligned thick oxide.

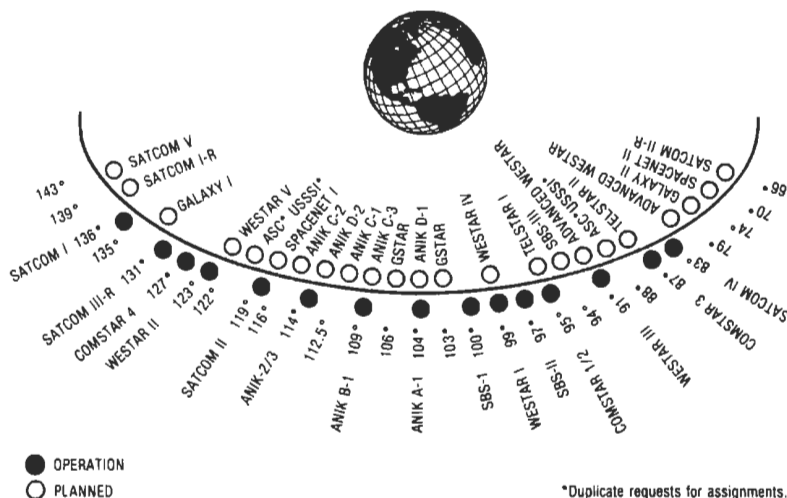
saturable-core magnetometer—A magnetometer in which the change in permeability of a ferromagnetic core provides a measure of the field.

saturable-core oscillator—A relaxation oscillator in which the occurrence of saturation in a magnetic core initiates a change in the conductive state of amplifying or switching elements.

saturable-core reactor—*See* saturable reactor.

saturable ferrite-core switch—A keyboard switch. In the off position, the magnets straddling the ferrite core saturate it and inhibit a drive signal from being picked up by the sense wire through transformer action. When the key is depressed, the magnetic field is removed, allowing the analog drive signal to be coupled to the sense wire, and the switch turns on.

saturable reactor—Also called a saturable-core reactor. A magnetic-core reactor whose reactance is



controlled by changing the saturation of the core by varying a superimposed unidirectional flux.

saturable transformer—A saturable reactor with an additional winding to provide voltage transformation or isolation from the ac supply.

saturated—That operating state of a transistor in which there is no further increase in collector current when the base current increases; in this state, the collector-emitter voltage is low, typically less than 1 volt.

saturated color—A pure color—i.e., one not contaminated by white.

saturated logic—A type of logic in which one output state is the saturation voltage of a transistor. Examples are resistor-transistor logic (RTL), diode-transistor logic (DTL), and transistor-transistor logic (TTL). *See also* unsaturated logic.

saturated recovery time—The recovery time of a thermal relay measured when the relay is deenergized after temperature saturation (equilibrium) has been reached.

saturated reoperate time—Reoperate time of a thermal relay when temperature saturation (equilibrium) is reached before the relay is deenergized.

saturating reactor—A magnetic-core reactor capable of operating in the region of saturation without independent control means.

saturating signal—In radar, a signal of greater amplitude than the dynamic range of the receiving system.

saturation—1. A term applied to a color that is “pure” to the extent that it is not mixed with white light. The less white light, the more saturated the color is said to be. This is suggestive of signal-to-noise ratio, where the “noise” in this case is white light. 2. The operating condition of a transistor when an increase in base current produces no further increase in collector current. 3. The state of magnetism beyond which a metal or alloy is incapable of further magnetization—i.e., the point beyond which the B/H curve is a straight line. 4. A circuit condition whereby an increase in the driving or input signal no longer produces a change in the output. 5. The condition in which a transistor is driven so hard that it becomes biased in the forward direction. In a switching application, the charge stored in the base region prevents the transistor from turning off quickly under saturation conditions. 6. The condition in an electron tube

when maximum current is passing through the cathode circuit. 7. An effect that occurs when a tape is fully magnetized, and further increase of signal input level does not produce a corresponding increase in recorded level. Saturation can also occur in the magnetic structure of the heads. 8. In color TV, the degree to which a color is undiluted with white light or is pure. Saturation is directly related to the amplitude of the chrominance signal. 9. Generally, that state in which a semiconductor device is conducting most heavily for a given applied voltage. In many devices it is also a state in which the normal amplification mechanisms have become swamped and inoperative.

saturation absorption—The condition obtainable between pairs of electron energy levels whereby, under very high radiation intensity, the absorption coefficient gradually decreases to zero because of the absence of empty levels to which transition can occur.

saturation control—In a color television receiver, a control that regulates the amplitude of the chrominance signal. The latter, in turn, determines the color saturation.

saturation current—1. The current in the plate circuit of a vacuum tube when all electrons emitted by the cathode pass on to the plate. 2. The current between the base and collector of a transistor when an increase in the emitter-to-base voltage causes no further increase in the collector current. 3. The maximum current obtainable as the applied voltage is increased. 4. Current passed by a reverse-biased semiconductor pn junction, which is composed of minority carriers drifting across the potential barrier of the depletion layer. The term saturation is used because in material that is even moderately doped the number of minority carriers present in the material is almost solely determined by the lattice excitation, so that once all the minority carriers available at a given excitation level are involved in the reverse conduction, further increases in reverse bias produce virtually no increase in current.

saturation curve—A magnetization curve for a ferromagnetic material.

saturation flux density—*See* saturation induction.

saturation induction—Sometimes loosely referred to as saturation flux density. The maximum intrinsic induction possible in a material.

saturation limiting—Limiting the minimum output voltage of a vacuum-tube circuit by operating the tube in the region of plate-current saturation.

saturation magnetization—The magnetic condition of a body when an increase in the magnetizing force produces practically no change in the intensity of magnetization.

saturation moment—The greatest magnetic moment possible in a sample of magnetic material.

saturation noise—The noise arising when a uniformly saturated tape is reproduced. This is often some 15 dB higher than the bulk-erased noise and is associated with imperfect particle dispersion.

saturation point—The point beyond which an increase in one of two quantities produces no increase in the other.

saturation recording—Direct digital recording. So called because the magnetic coating on the recording tape is fully saturated by the recording process. Normal audio recording uses only a small portion of the tape's "magnetic energy" to reduce harmonic distortion to acceptable levels. By magnetically saturating the tape, however, variations in tape sensitivity are masked and the higher-level playback is better able to overcome noise.

saturation resistance—1. Ratio of voltage to current in a saturated semiconductor. 2. The resistance between collector and emitter terminals under specified conditions of base current and collector current, when the collector current is limited by the external circuit.

saturation value—1. The highest value that can be obtained under given conditions. 2. The value of magnetic-flux density beyond which increases in the magnetizing force have no appreciable effect on the flux density in a particular sample of magnetic material.

saturation voltage—1. The voltage drop appearing across a switching transistor (collector-emitter) that is fully turned on. 2. Generally, the voltage excursion at which a circuit self-limits (i.e., is unable to respond to excitation in a proportional manner). In operational amplifiers, the output-voltage saturation limits may be imposed by any stage, from the input to the output, depending in part on the external loading and feedback parameters. 3. The voltage between base and emitter required to cause collector current saturation. 4. The residual voltage between collector and emitter terminals under specified conditions of base current and collector current, the collector current being limited by the external circuit.

SAW—Abbreviation for surface acoustic wave.

SAW device—Surface acoustic-wave device. A technology for broad-bandwidth signal delay, custom-designed filters, and complex generation and correlation at IF frequencies. SAW devices make use of a single-crystal, planar substrate with aluminum or gold electrode patterns fabricated by photolithography of a substrate of piezoelectric material. The electrode patterns are used to excite and detect minute acoustic waves that travel over the surface of the substrate much like earthquake waves travel over the crust of the earth.

SAW (surface acoustic wave) filter—An electronic device that allows a sharp transition between regions of allowed and attenuated frequencies.

sawtooth—A waveform increasing approximately linearly as a function of time for a fixed interval, returning to its original state sharply, and repeating the process periodically.

sawtooth current—A current that has a sawtooth waveform.

sawtooth generator—An oscillator providing an alternating voltage with a sawtooth waveform.

sawtooth-modulated jamming—An electronic-countermeasure technique in which a high-level jamming signal is transmitted so that large AGC voltages are developed at the radar receiver and the target pip and receiver noise are caused to disappear completely.

sawtooth voltage—A voltage that varies between two values in such a manner that the waveshape resembles the teeth of a saw.

sawtooth wave—A periodic wave whose amplitude varies linearly between two values. A longer interval is required for one direction of progress than for the other.



Sawtooth wave.

sawtooth waveform—A waveform that has a slow or sloping rise time and a sharp or sudden fallback to the starting point, resembling the teeth of a saw.

saxophone—A linear-array antenna with a cosecant-squared radiation pattern.

SBA—Abbreviation for standard beam approach.

S-band—Microwave band in which the wavelengths are at or near 10 cm.

SBT—Abbreviation for surface-barrier transistor.

SCA—Abbreviation for Secondary (or Subsidiary) Communications Authorization. Permission granted by the FCC for an FM broadcaster to send out, on the same carrier frequency and simultaneously with the regularly heard program, a program in addition to the one heard with ordinary receivers. The purpose is to provide special programming to a limited audience without the cost of an entire new transmitter. SCA is primarily for the transmission of programs that are of a broadcast nature but which are of interest primarily to limited segments of the public wishing to subscribe. This includes background music, storecasting, detailed weather forecasting, special time signals, and other material of a broadcast nature expressly designed and intended for business, professional, educational, religious, trade, labor, agriculture, or other groups engaged in any lawful activity. SCA facilities may also be used in transmission of signals directly related to the operation of FM broadcast stations.

SCA channel—Abbreviation for subsidiary carrier authorization channel. A channel that carries program material modulated onto a radio frequency subcarrier on a CATV system or an FM broadcast signal.

SCA demodulator—Abbreviation for subsidiary carrier authorization demodulator. A (low-frequency) receiver tuned to a subcarrier signal broadcast by an FM radio station. It is connected to the multiplex output in an FM receiver and demodulates the subcarrier program carrying subscription music, stock reports, etc.

scalar—1. A quantity that has magnitude but no direction (e.g., real numbers). 2. A circuit with two stable states, which can be triggered to the opposite state by appropriate means (a bistable circuit).

scalar feed—A type of horn antenna feed that uses a series of concentric rings to capture signals that have been reflected toward the focal point of a parabolic antenna.

scalar function—A function that has magnitude only. Thus, the scalar product of two vectors is a scalar function, as is a real function of a real variable.

scalar operations—Mathematical operations performed on random data elements rather than on sequential data elements.

scalar processing—Calculations performed one at a time.

scalar quantity—Any quantity that has magnitude only—e.g., time, temperature, quantity of electricity.

scale—1. A series of musical notes, symbols, sensations, or stimuli arranged from low to high by a specified scheme of intervals suitable for musical purposes. 2. The theoretical basis of a numerical system. 3. A series of markings used for measurement or computation. 4. A defined set of values, in terms of which different quantities of the same nature can be measured. 5. In a computer, to change the units of a variable so that the problem is within its capacity. 6. To change a quantity by a factor in order to bring its range within prescribed limits.

scale division—The space between two adjacent markings on a scale.

scale error (full-scale error)—The departure from design output voltage of a DAC for a given input code, usually full-scale code. In an ADC, it is the departure of actual input voltage from design input voltage for a full-scale output code. Scale errors can be caused by errors in reference voltage, ladder resistor values or amplifier gain, etc.

scale factor—1. In analog computing, a proportionality factor that relates the magnitude of a variable to its representation within a computer. 2. In digital computing, the arbitrary factor that may be associated with numbers in a computer to adjust the position of the radix point so that the significant digits occupy specified columns. 3. The factor by which the number of scale divisions indicated or recorded by an instrument must be multiplied to compute the value of the measurand. 4. A value used to convert a quantity from one notation to another. 5. The amount by which a measured quantity must change in order to produce unit deflection of a recording pen.

scale length (of an indicating instrument)—The length of the path described by the tip of the pointer (or other indicating means) in moving from one end of the scale to the other. Pointers that extend beyond the scale division marks are considered to end at the outer end of the shortest division marks; in multiscale instruments, the longest scale is used in determining the scale length.

scale-of-ten circuit—*See* decade scaler.

scale-of-two counter—A flip-flop circuit in which successive similar pulses are applied at a common point, causing the circuit to alternate between its two conditions of permanent stability.

scaler—Also called a scaling circuit. A circuit that produces an output after a predetermined number of input pulses have been received.

scaler frequency meter—A frequency meter in which electronic circuits are used for counting and gating electrical signals to indicate their number and/or rate.

scale span—The algebraic difference between the values of the actuating electrical quantity corresponding to the two ends of the scale of an instrument.

scaling—1. An electronic method of counting electrical pulses occurring too fast to be handled by mechanical recorders. 2. The changing of a quantity from one notation to another. 3. Adjusting the coefficient of a circuit to each of its one or more input-signal terminals. The relative scaling of one input to another is called weighting. 4. In computing, relating problem variables to machine variables.

scaling circuit—*See* scaler.

scaling factor—Also called the scaling ratio. The number of input pulses per output pulse required by a scaler.

scaling ratio—*See* scaling factor.

scallop distortion—In videotape recording, a series of small, vertical curves in the recorded image. Caused by unequal stretching across the width of the tape.

SCA modulator—Abbreviation for subsidiary carrier authorization modulator. A device that takes an audio input and modulates a supersonic frequency that can be combined with the regular audio input to an FM transmitter, which will thus broadcast two programs simultaneously. The SCA program for which the subscriber pays will not be heard unless the FM receiver is equipped with an SCA demodulator.

scan—1. In facsimile, to analyze the density of successive elemental areas of the subject copy in a predetermined pattern at the transmitter, or to record these areas at the recorder. 2. To examine point by point—e.g., in converting a televised scene or image into a methodical sequence of elemental areas. 3. One sweep of the mosaic in a camera tube or of the screen in a picture tube. 4. To sample each of a number of inputs intermittently. A scanning device may provide additional functions such as record or alarm.

scan-coded tracking system—*See* monopulse tracking.

scan converter—1. A device that converts computer video to a TV video format. 2. Equipment that samples radar images at a 3-kHz to 10-kHz rate that can be sent over telephone lines or narrow bandwidth radio circuits and converted into a slow-scan image by a similar converter. *See also* slowed-down video.

scan-converter tube—A device consisting of a cathode-ray tube and a vidicon imaging tube assembled face to face in the same envelope.

scanistor—An integrated semiconductor optical-scanning device that converts images into electrical signals. The output analog signal represents both the amount and the position of the light shining on its surface.

scan line—One of the many horizontal lines that make up the picture on a video screen.

scan moiré—*See* moiré effect.

scanner—1. A device that converts images or text on paper into data that can be manipulated by a computer. 2. An instrument that automatically samples or interrogates the state of various processes, conditions, or physical states and initiates action in accordance with the information obtained. 3. In a facsimile transmitter, the part that systematically translates the densities of the subject copy into the signal waveform. 4. The moving parts of an antenna that cause the beam to scan. 5. A switching device that sequentially samples a number of points.

scanner amplifier—An amplifier in a facsimile transmitter used to amplify the output-signal voltage of the scanner.

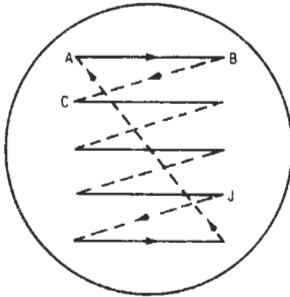
scanner radio—A receiver that can automatically check the airwaves for signals from preselected stations that are broadcasting at the time. When it picks up such signals, the scanner pauses at the station setting for as long as the signals last—or for as long as you care to listen. When the signals stop for a few seconds, the scanner automatically tunes itself to the next preselected channel that may be broadcasting.

scanning—1. In television, facsimile, or picture transmission, the successive analyzing or synthesizing, according to a predetermined method, of the light values or equivalent characteristics of elements constituting a picture area. 2. In radar, the directing of a beam of radio-frequency energy successively over the elements of a given region, or the corresponding process in reception. 3. The comparison of input variables with some reference to determine a particular action. 4. The successive exposure of small portions of an object to a sensing device

of some type. Television, radioactive scanning, facsimile transmission, and photoelectric scanning are all examples of this technique. 5. Moving the electron beam of an image pickup tube or a picture tube diagonally across the target or screen area of tube. 6. The process of translating images into digital form that can be recognized by a computer.

scanning-antenna mount—An antenna support that provides a mechanical means for scanning or tracking with the antenna, and a means for taking off information and using it for indication and control.

scanning beam—A beam of light, a radar beam, or an electron beam that is used in scanning.



Scanning beam.

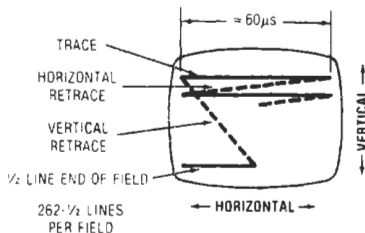
scanning circuit—A circuit that produces a linear, circular, or other movement of the beam in a cathode-ray tube at regular intervals.

scanning disc—1. A rotating tricolor wheel used between the camera lens and subject, or picture tube and viewer, in field-sequential color television. 2. A Nipkow disc.

scanning frequency—See stroke speed.

scanning head—A light source and a phototube combined as a single unit for scanning a moving strip of paper, cloth, or metal in photoelectric side-register control systems.

scanning line—A single, narrow, continuous strip containing highlights, shadows, and halftones of the picture area, as determined by the scanning process.



Scanning lines.

scanning linearity—In television, the uniformity of the scanning speed during the trace interval.

scanning-line frequency—The number of scanning lines per second. See also stroke speed.

scanning loss—In a radar system employing a scanning antenna, the reduced sensitivity that occurs in

scanning-antenna mount — scatter propagation

scanning across a target compared with the sensitivity when a constant beam is directed at the target. This loss is expressed in decibels.

scanning sonar—An echo-ranging system in which the sound pulse is transmitted simultaneously through the entire angle to be searched and a rapidly rotating transducer having a narrow beam angle scans for the returning echoes.

scanning speed—The number of inches per second explored by the spot of light or other source of energy in television, facsimile, radar, etc.

scanning spot—1. The immediate area being explored at any instant by a spot of light or other energy source in television, facsimile, radar, etc. See also picture element. 2. The spot illuminated on a cathode-ray tube by the initial impact of the scanning ray and the screen.

scanning yoke—A yoke-shaped iron core that supports the electromagnetic deflecting coils around the neck of some cathode-ray tubes.

scannogram—The recording made on paper by a scanner.

scan rate—The rate at which a control computer periodically checks a controlled quantity.

scan time—1. The time necessary to completely execute the entire programmable controller program one time. 2. The time necessary to completely execute an entire program one time. 3. The time required to examine the state of all inputs.

SCA rejection—The ratio of the 67-kHz SCA signal at the output to the desired output with the standard FCC signal input.

SCART—A 20-pin rectangular connector used on TV receivers in PAL areas. The connector provides composite video inputs and outputs, stereo audio inputs and outputs and RGB input. It is also known as Euro-connector.

scatter—1. A disordered change in the direction of propagation when radio waves encounter matter. 2. Spurious radar echoes due to reflections from layers of the ionosphere.

scatterband—In pulse systems, the total bandwidth occupied by the frequency spread of numerous interrogations operating on the same nominal radio frequency.

scattered reflections—Reflections from portions of the ionosphere at different virtual heights. These reflections interfere with each other and cause rapid fading of the signal.

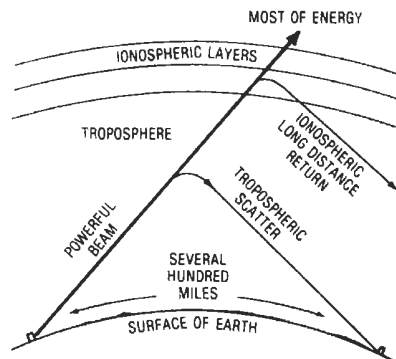
scattering—1. The change in direction, frequency, or polarization of radio waves when they encounter matter. 2. In a narrower sense, a disordered change in the incident energy of (1) above. 3. The change of direction of particles or systems. 4. The diffusion of a sound or light beam due to discontinuities in the transmitting medium. 5. Change of the spatial distribution of a beam of radiation when it interacts with a surface or a heterogeneous medium, in which process there is no change of wavelength of the radiation.

scattering loss—That part of the transmission lost because of scattering within the medium or the roughness of the reflecting surface.

scatter loading—In a computer, the form of fetch that may result in placement of the control sections of a load module in nonadjoining main-storage positions.

scatterometer—A wide-sweep radar for terrain mapping.

scatter propagation—Also called beyond-the-horizon propagation, beyond-the-horizon transmission, or over-the-horizon transmission. Transmission of high-power radio waves beyond line-of-sight distances by reflecting them from the troposphere or ionosphere.



Scatter propagation.

scatter read—The ability of a computer to distribute data into several memory areas as it is being entered into the system from magnetic tape.

SCC—Abbreviation for spark control computer. An analog electronic system (Chrysler Corp.) that accurately controls spark timing in response to various inputs, including engine temperature, manifold pressure, air temperature, and air pressure. Used with EGR, it provides for cleaner exhaust and better fuel economy.

scc wire—Abbreviation for single-cotton-covered wire.

SCEPTRON—Acronym for spectral comparative pattern recognizer. A device that automatically classifies complex signals derived from any type of information that can be changed into an electrical signal.

scheduled maintenance—Maintenance performed according to an established plan.

scheduling—Determining the order in which job programs will use the available computer facilities.

schematic—1. A diagram that shows, by means of graphic symbols, the electrical connections and functions of a specific circuit arrangement. 2. A representation of the components of an electrical circuit and their interconnections by symbols and lines.

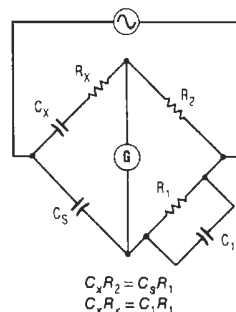
schematic circuit diagram—See schematic diagram.

schematic diagram—Also called a schematic circuit diagram, diagram, or schematic. 1. A diagram of the electrical scheme of a circuit, with components represented by graphical symbols. 2. A drawing that shows by means of graphic symbols the electrical connections, components, and functions of a specific circuit arrangement. 3. A functional diagram of an electrical circuit in which the components are represented by conventional symbols, and wires interconnecting them by lines.

Schering bridge—A four-arm alternating-current bridge used for measuring capacitance and dissipation factor. The unknown capacitor and a standard loss-free capacitor form two adjacent arms, the arm adjacent to the standard capacitor consists of a resistor and capacitor in parallel, and the fourth arm is a nonreactive resistor.

schlieren—An optical system that produces images in which the illumination or hue at a given point is related to the angular deflection a light ray undergoes in passing through the corresponding point in the object. The object is back-illuminated, and a straightedge, circular aperture, or graded density or multicolored filter is employed in the system to discriminate between deflected and undeflected rays.

Schmidt antenna—A microwave scanning antenna similar in principle to the optical Schmidt camera. The



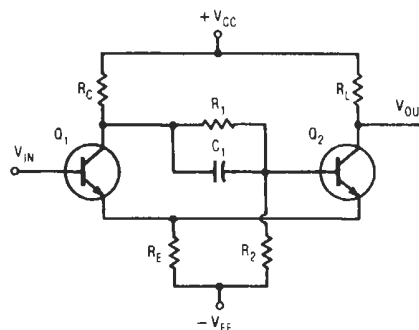
Schering bridge.

spherical reflector has a spheric microwave lens at the center of curvature and a scanner is located approximately halfway between these elements.

Schmidt optical system—An optical system for magnifying and projecting a small, brilliant image from a projection-type cathode-ray tube onto a screen.

Schmitt limiter—See Schmitt trigger.

Schmitt trigger—Also called Schmitt limiter. 1. A bistable pulse generator in which an output pulse of constant amplitude exists only as long as the input voltage exceeds a certain dc value. The circuit can convert a slowly changing input waveform to an output waveform with sharp transitions. Normally, there is hysteresis between an upper and a lower triggering level. 2. A regenerative circuit that changes state abruptly when the input signal crosses specified dc triggering levels. 3. A bistable device that utilizes the effect of hysteresis. In the Schmitt trigger, hysteresis is a form of nonlinear operation that forces the output to be dependent not only on the absolute value of the input, but also on the most recent prior value of the input. This hysteresis is characterized by two different switching threshold levels: one for positive-going input transitions and the other for negative-going input transitions.



Schmitt trigger.

schmoo plot—An x, y plot giving the pass/fail region for a specific test while varying the parameters in x and y coordinates.

schooping—Spraying metal onto the ends of the roll of a metallized capacitor. This provides a metal surface on the ends of the roll to which the leads are then soldered.

Schottky—A bipolar technology that is faster than standard TTL but often uses more power.

Schottky barrier—1. A simple metal-to-semiconductor interface that exhibits a nonlinear impedance. 2. A metal and a semiconductor. A metal-insulator-semiconductor (MIS) barrier contains a very thin film of oxide between the metal and semiconductor layers; in a semiconductor-insulator-semiconductor (SIS) barrier, a high-conductivity, transparent, large-bandgap semiconductor layer replaces the metal of the MIS cell. 3. A junction diode with the junction formed between the semiconductor and a metal contact rather than between dissimilar semiconductor materials, as in the case of an ordinary pn diode.

Schottky-barrier detector—A detector based on a Schottky barrier—a current-rectifying contact at a junction between a semiconductor and a metal.

Schottky barrier diode—Also called Schottky diode and hot carrier diode. 1. A junction diode with the junction formed between the semiconductor and a metal contact rather than between dissimilar semiconductor materials, as in the case of an ordinary pn diode. 2. A special diode characterized by nanosecond switching speed, but relatively low voltage (45 V max) and limited temperature range (125°C to 150°C).

Schottky diode—See Schottky barrier diode.

Schottky rectifier—A high-speed rectifier that makes use of the rectification effect of a metal-to-silicon barrier. Low forward-voltage characteristics provide high rectification efficiency, while majority carrier forward conduction enhances switching speed.

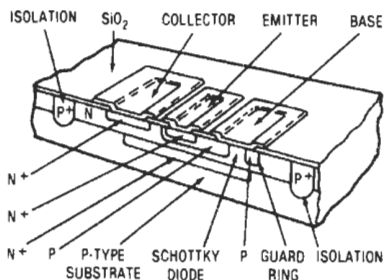
Schottky transistor logic—Abbreviated STL. An improved version of integrated injection logic that has a power-delay product that is three times lower than that for I²L.

Schottky TTL—1. A TTL circuit that incorporates Schottky diodes to greatly speed up TTL circuit operation. 2. A very high speed TTL circuit using metal/semiconductor diodes (Schottky diodes) to prevent transistors from saturating. 3. Integrated circuits modified by having a special diode built into each transistor. These diodes enable the transistor to be turned off much faster than would otherwise be possible.

scientific notation—In a calculator, the number entered or a result displayed in terms of a power of 10.



Schematic.



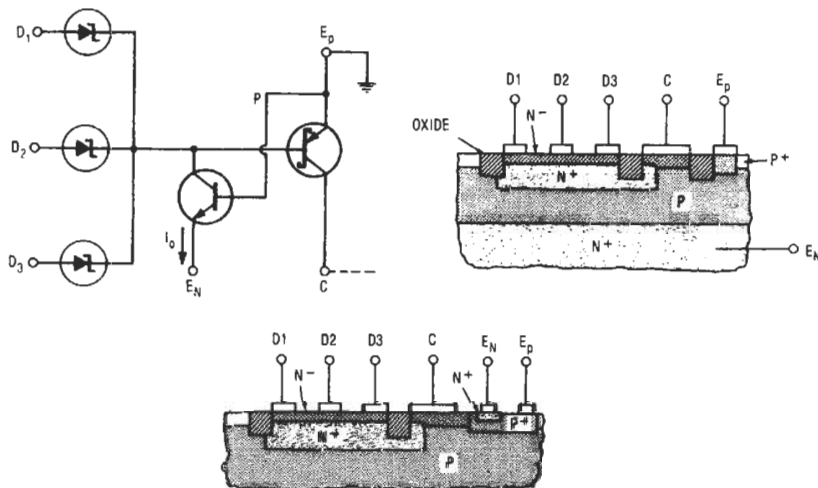
Cross section.

Schottky barrier diode.

For example, the number 1234 is entered as 1.234×10^3 , and the number 0.001234 would appear as 1.234×10^{-3} .

scintillation—To emit flashes of light.

scintillation—1. In radio propagation, a random and usually relatively small fluctuation of the received field about its mean value. 2. Also called target glint or wander. On a radar display, a rapid apparent displacement of the target from its mean position. 3. The flash of light produced by an ionic action. 4. A momentary breakdown of a tantalum oxide film in a capacitor, accompanied by rapid heating of the dielectric. Such events are caused by capacitor overvoltages or improper techniques of capacitor manufacture. 5. The flash of light produced by certain crystalline materials when a charged particle is passed through them. 6. Rapid fluctuation in parameters such as the amplitude or the phase of a wave passing through a medium with small-scale irregularities that cause irregular changes in the transmission path with time; akin to twinkling.



Schottky transistor logic.

scintillation conversion efficiency—In a scintillator, the ratio of the optical photon energy emitted to the energy of the incident particle or photon of ionizing radiation.

scintillation counter—A device that indirectly detects charged particles and gamma rays and neutrons by using a photomultiplier tube to convert the short flashes of light produced as the particle passes through a transparent scintillating material into electric signals that can be recorded. One advantage of scintillation counters is that they are very fast; by this is meant that they have a very small resolving time.

scintillation-counter cesium resolution—The scintillation-counter energy resolution for the gamma ray or conversion electron emitted from cesium-137.

scintillation-counter energy resolution—In a scintillation counter, a measure of the smallest discernible difference in energy between two particles or photons of ionizing radiation.

scintillation-counter energy-resolution constant—The product of the square of the scintillation-counter energy resolution times the specified energy.

scintillation-counter head—The combination of scintillators and photosensitive devices that produces electrical signals in response to ionizing radiation.

scintillation-counter time discrimination—In a scintillation counter, a measure of the smallest time interval between two successive individually discernible events. Quantitatively, the standard deviation of the time-interval curve.

scintillation crystals—Special crystals that emit flashes of light when struck by alpha particles.

scintillation decay time—The time required for the decrease of the rate of emission of optical photons in a scintillation from 90 percent to 10 percent of the maximum value.

scintillation duration—The interval from the time of emission of the first optical photon of a scintillation to the time when 90 percent of the optical photons of the scintillation have been emitted.

scintillation rise time—The time interval occupied by the increase of the rate of emission of optical photons of a scintillation from 10 percent to 90 percent of the maximum value.

scintillator—The combination of the body of scintillator material and its container.

scintillator material—A material that exhibits the property of emitting optical photons in response to ionizing radiation.

scintillator-material total-conversion efficiency—In a scintillator material, the ratio of the produced optical photon energy to the energy of a particle or photon of ionizing radiation that is entirely absorbed in the scintillator material.

scissor—To apportion a drawing into segments that can be viewed on a CRT screen.

scissoring—The ability of the vector generator to blank the beam whenever it is moved outside of the screen (where the image becomes distorted).

scope—Slang for a cathode-ray oscilloscope.

scophony television system—A mechanical television projection system developed in England. In it, ingenious optical and mechanical methods provide large, bright images suitable for theater installation as well as home television receivers. The apparent screen brightness is multiplied several hundred times because several hundred picture elements are projected simultaneously.

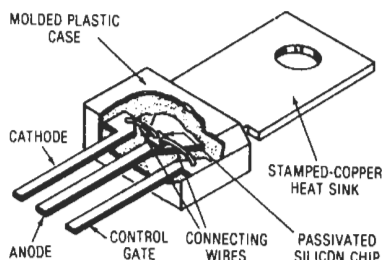
scored substrate—A substrate that has been scribed with a thin cut at the break lines. *See* snap-strate.

scoring system—In motion-picture production, a system for recording music in time with the action on the film.

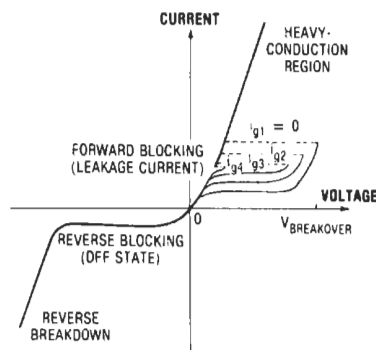
Scott connection—A method of connecting transformers to convert two-phase power to three-phase or vice versa.

Scott's breakdown theory—Breakdown is due to the attainment of a critical avalanche size that leads to a conducting path.

SCR—Abbreviation for silicon controlled rectifier. The formal name is reverse-blocking triode thyristor. 1. A thyristor that can be triggered into conduction in only one direction. Terminals are called anode, cathode, and gate. 2. A semiconductor device that functions as an electrically controlled switch for dc loads. The SCR is one type of thyristor. 3. A power switching device in which a pulse at the gate (input) initiates a switching action in the output circuit. It conducts only during the positive half-cycle of ac. 4. A type of thyristor that is designed for forward bias, unidirectional power switching, and control. *See also* thyristor.



In molded plastic case.



Characteristic curve.

SCR.

scramble—1. To transpose and/or invert bands of frequencies, or otherwise modify the form of the intelligence at the transmitting end, according to a prearranged scheme in order to obtain secrecy. 2. To mix, in cryptography, in a random or quasi-random fashion.

scrambled speech—Also called inverted speech. Speech that has been made unintelligible (e.g., for secret transmission) by inverting its frequency. At the receiving end, it can then be converted back into intelligible speech by reinverting the frequency.

scrambler—1. A device used to electronically alter a signal so that it can only be viewed or heard on a receiver equipped with a special decoder. 2. An electrical device that uses one or more methods to convert speech or video into a secret, unintelligible form. 3. A device that changes data so it appears to be in a random pattern. A descrambling device can change (unscramble) this data back to its original pattern.

scrambler circuit—Also called a speech scrambler. A circuit in which essential speech frequencies are divided into several ranges by filters and then inverted to produce scrambled speech. *See also* speech inverter.

scrambling—A method of altering the identity of a video or audio signal in order to prevent its reception by persons not having authorized decoders.

scratch filter—A low-pass filter, often an integral part of an amplifier circuit, that attenuates the higher frequency noise derived from disk recordings. The scratch filter is also suitable for the suppression of background noise produced by tape background hiss.

scratch pad—1. Information that the processing unit of a computer stores or holds temporarily. It is a memory containing subtotals for various unknowns that are needed for final results. 2. An area of RAM used for short-term storage of data during a process. 3. Group of general-purpose registers without specific function, providing a high-speed workspace. Usually, an internal RAM in a computer.

scratch-pad memory—1. A high-speed, limited-capacity computer information store that interfaces directly with the central processor. It is used to supply the central processor with the data for the immediate computation, thus avoiding the delays that would be encountered by interfacing with the main memory. (The function of the scratch-pad memory is analogous to that of a pad of paper used for jotting down notes.) 2. A high-speed memory used to temporarily store small amounts of data that may be needed often and without delay. 3. Any memory space used for the temporary storage of data. Typically, scratch-pad memories are high-speed integrated circuits that are addressed as internal registers.

screen—1. The surface on which the visible pattern is produced in a cathode-ray tube. 2. A metal partition that isolates a device from external electric or magnetic fields. 3. *See* screen grid. 4. Surface on which the master artwork of the circuit pattern is projected. Screen fabrics include polyester, stainless steel, nylon, and silk. 5. The surface of a medium on which a visible image, pattern, or picture is produced, generally within a camera or cathode-ray tube.

screen angle—A vertical angle bounded by a straight line from the radar antenna to the horizon and the horizontal at the antenna, assuming a $4/3$ earth's radius.

screen deposition—The laydown of a circuit pattern on a substrate using the silk screening technique.

screen dissipation—The power that the screen grid dissipates as heat after bombardment by the electron stream.

screen grid—Also called a screen. A grid placed between a control grid and an anode in a vacuum tube and usually maintained at a fixed positive potential. By reducing the electrostatic influence of the anode, it prevents the electrons from bunching in the space between the screen grid and the cathode.

screen-grid modulation—Modulation produced by introducing the signal into the screen-grid circuit of any multigrid tube where the carrier is present.

screen-grid tube—A vacuum tube in which a grid is placed between the control grid and the anode to prevent the latter from reacting with the control grid.

screen-grid voltage—The direct-voltage value applied between the screen grid and the cathode of a vacuum tube.

screening—1. The process whereby the desired film circuit patterns and configurations are transferred to the surface of a substrate during manufacture by forcing a material through the open areas of the screen, using the wiping action of a soft squeegee. 2. The display of raw or processed data for operator verification. 3. The process of performing 100-percent inspection on product lots and removing defective units.

screening test—A test or combination of tests intended to remove unsatisfactory items or those likely to exhibit early failure.

screen printing (thick film)—1. The art of depositing conductive, resistive, and insulating materials on a dielectric base. This deposition is made through selected open areas in screens with inks or pastes forced through the open areas of the screen by squeegee motion onto the substrate base. In some cases, masks instead of conventional mesh screens may be used. 2. The basic thick-film deposition process in which the paste is squeezed through a fine-mesh stencil screen to produce a prescribed pattern on a substrate.

screen savers—Software that automatically blanks a monitor screen or displays a moving pattern if there has been no user interaction with the computer for a specified time. Screen savers are used to preventing a fixed pattern from being burned into the screen phosphor. As soon as the operator touches any key or moves the mouse, the screen saver disappears and the original display returns to the screen.

scribe and break—The procedure used to separate a processed semiconductor wafer into individual ICs. Narrow channels between individual ICs are mechanically weakened by scratching with a diamond tip (scribe), sawing with a diamond blade, or burning with a laser. The wafer is mechanically stressed and broken apart along the channels (called scribe lines), thereby separating the individual ICs (dice).

scribe projection—A method of automatic information presentation in which information is placed on a small metallic-coated glass slide by using a movable, servocontrolled, fine-pointed scribe to remove the coating. Light passed through the scribed area is projected onto a screen.

scribing—1. A process, similar to glass cutting, in which a slice of semiconductor devices is scored in rows and columns so that it may be separated easily into individual devices. The process is performed in a machine called a scriber by repeated movement of a weighted diamond stylus across the slice to form the scored pattern. 2. Scratching a tooled line or laser path on a brittle substrate to allow a wafer to be cleft or broken along the line, producing IC, transistor, or diode chips when all breaks are completed.

scribing machines and tools—Equipment used to separate wafers into individual devices, chips, or dice. This has been done by crude techniques similar to glass cutting, but is now accomplished by more efficient methods using truncated pyramid diamond scribes, automated machines, conical tools, or lasers.

script—Much like a macro, a set of program commands used to automate routine computing tasks.

scroll—1. To move a video display up or down, line by line, or side to side, character by character. 2. To move all or part of the screen material up or down, or left or right, to allow new information to appear.

scrolling—1. Moving the contents of the screen of a CRT up or down by one line at a time. 2. A multiple-display function that allows all displayed rungs to be

moved up or down, adding the next or preceding rung at the bottom (or top) of the display. (As determined by the user, the display may be changed either one rung at a time or continuously.) 3. The vertical movement of information on a CRT screen, caused by the dropping of one line of displayed information for each new line added; the movement appears as an upward rolling if the new line is added at the bottom of the screen, and vice versa.

scrubbing action—Rubbing of a chip device around on a bonding operation to break up the oxide layer and improve wettability of the eutectic alloy used in forming the bond.

SCS—Abbreviation for silicon-controlled switch.

SCU—Abbreviation for subscriber channel unit. A telephone interface circuit.

S-curve—An S-shaped frequency-response curve showing how the output of a frequency-modulation detector or circuit varies with frequency.

SDLC—Abbreviation for Synchronous Data Link Control. 1. A communications line discipline that initiates, controls, checks, and terminates information exchanges or communications lines. SDLC is designed for full-duplex operation (simultaneously sending and receiving data). 2. A protocol specifying a layered approach to serial data communications.

sea clutter—See sea return.

seal—Any device used to prevent gases or liquids from passing through.

sealed contacts—A contact assembly enclosed in a sealed compartment separate from the other parts of the relay.

sealed-gage pressure transducer—A pressure transducer that has the sensing element sealed in its case at room ambient pressure. The sealing method holds the original internal pressure for long periods of time.

sealed meter—A meter constructed so that moisture or vapor cannot enter the meter under specified test conditions.

sealed relay—A relay that has both coil and contacts enclosed in a relatively airtight cover.

sealed tube—A hermetically sealed electron tube used chiefly for pool-cathode tubes.

sealing compound—A type of wax or pitch compound used in dry batteries, capacitor blocks, transformers, or circuit units to keep out air and moisture.

sealing off—The final closing of the bulb of a vacuum tube or lamp after evacuation.

seam welding—A resistance welding process in which overlapping spot welds are made progressively along a joint by means of circular electrodes. The circular seam-welding wheels roll along the overlapping edges to be welded, and the control circuit is arranged to pass current at sufficiently close intervals to produce the desired degree of overlapping of the spot welds. The primary purpose of a seam-welding joint is to produce liquid or airtight containers from comparatively thin sheet metal.

search—1. In a radar operation, the directing of the lobe (beam of radiated energy) in order to cover a large area. A broad-beam antenna may be used, or a rotating or scanning antenna. 2. A systematic examination of the available information in a specific field of interest. 3. To scan available stored information. 4. The process of applying a sweeping tuning signal to the free-running oscillator portion of a phase-locked oscillator, causing the oscillator output frequency to pass within the capture bandwidth of the feedback network and ensuring a locked condition in response to a new reference frequency. 5. The process of finding a particular item in a file. Search

techniques include the sequential or linear search, the binary or logarithmic search, and direct lookup.

search coil—See magnetic test coil.

search engine—1. A computer program that helps users find information in most databases. 2. A database or index that can be queried to help find information on the World Wide Web.

search gate—A gate pulse that is made to search back and forth over a certain range.

searchlighting—In radar, the opposite of scanning. Instead, the beam is projected continuously at an object.

searchlight-type sonar—An echo-ranging system employing the same narrow beam pattern for both transmission and reception.

search radar—A radar intended primarily for displaying targets as soon as possible after their entrance into the coverage area.

search receiver—See intercept receiver.

search time—The time required for location of a particular data field in a computer storage device. The process involves comparison of each field with a predetermined standard until an identity is obtained. Contrasted with access time.

sea return—Also called sea clutter. In radar, the aggregate received echoes reflected from the sea.

seasonal factors—Factors that are used to adjust sky-wave absorption data for seasonal variations. Those variations are due primarily to seasonal fluctuations in the heights of the ionospheric layers.

seasoning—Overcoming a temporary unsteadiness of a component that may appear when the component is first installed.

seating time—The elapsed time after the coil of a relay has been energized until the armature of the relay is seated.

sec—Abbreviation for secondary winding of a transformer.

SEC—Abbreviation for secondary-electron conduction. The transport of charge by secondary electrons moving through the interparticle spaces of a porous material under the influence of an externally applied electric field.

SECAM—Abbreviation for Sequential Color and Memory System (*Séquentiel Couleur avec Mémoire*). A color TV system with 625 lines per frame and 50 fields per second, used primarily in France, Russia, parts of Africa, and the former states of the Soviet Union. SECAM uses alternating lines of U, V chroma information to modulate the frequency. It is quite different from NTSC and PAL standards.

secondary—1. The transformer output winding in which the current is due to inductive coupling with another coil called the primary. 2. Low-voltage conductors of a power-distributing system.

secondary area—See secondary service area.

secondary breakdown—A condition that occurs in bipolar transistors brought on by hot spots occurring within the device structure. This is a type of thermal runaway and in most cases causes permanent device damage.

secondary calibration—Also called sense step. Calibration of accessory equipment in which a transducer is deliberately unbalanced electrically to change the output, voltage, current, or impedance. Generally performed by means of a calibration resistor that is placed across one leg of the bridge.

secondary cell—A voltaic cell that, after being discharged, may be restored to a charged position by an electric current sent through the cell in a direction opposite that of the discharge current. See also storage cell, 1.

secondary circuit—The high-voltage part of an ignition system.

secondary color—A color produced by combining any two primary colors in equal proportions. In the light-additive process, the three secondary colors are cyan, magenta, and yellow.

Secondary Communications Authorization—See SCA.

secondary electron—An electron emitted from a material as a result of bombardment by electrons or of the collision of a charged particle with a surface.

secondary-electron conduction tube—A sensitive TV tube that uses a two-step process to convert the invisible image to a charge image. In the image intensifier stage, light ejects electrons from a photoemitter. After imaging and amplification in the middle or imaging section, the primary photoelectrons fall on the thin-film face of the secondary target. This charge image modulates the scanning beam current from the reading section. The electric field applied across the film causes a majority of the secondary electrons to be transported through a potassium chloride low-density film layer to produce a secondary conduction current.

secondary-electron multiplier—An amplifier tube in which the electron stream is focused onto a succession of targets, each of which adds its secondary electrons to the stream. In this way, considerable amplification is provided.

secondary emission—The liberation of electrons from an element other than the cathode as a result of being struck by other high-velocity electrons. In a vacuum tube there are usually more secondary than primary electrons—a desirable phenomenon in electron-multiplier or dynatron-oscillator tubes. However, pentodes have a suppressor grid to nullify the undesirable effect of secondary emission.

secondary-emission ratio—The average number of secondary electrons emitted from a surface per incident primary electron.

secondary-emission tube—A tube that makes use of secondary emission to achieve a useful end. The photomultiplier is an example.

secondary failure—1. A failure occurring as a direct result of the abnormal stress on a component brought about by the failure of another part or parts. 2. Any failure that is the direct or indirect result of a primary failure.

secondary grid emission—Emission from the grid of a tube as a result of high-velocity electrons being driven against it and knocking off additional electrons. The effect is the same as for primary grid emission.

secondary insulation—A nonconductive material whose prime functions are to protect the conductor against abrasion and provide a second electrical barrier. Placed over the primary insulation.

secondary line—The conductors connected between the secondaries of distribution transformers and the consumer service entrances.

secondary radar—See radar.

secondary radiation—Random reradiation of electromagnetic waves.

secondary service area—Also called the secondary area. The service area of a radio or television broadcast station within which satisfactory reception can be obtained only under favorable conditions.

secondary standard—A unit (e.g., length, capacitance, weight) used as a standard of comparison in individual countries or localities, but checked against the one primary standard in existence somewhere in the world.

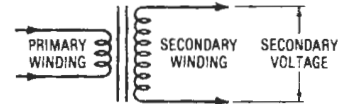
secondary station—Station licensed for a land location other than the primary station location, i.e., for

use at a subordinate location such as an office, vacation home, etc.

secondary storage—Also called auxiliary storage.

1. Storage that is not an integral part of a computer, but which is directly linked to and controlled by it. 2. Devices that are used to store large quantities of data and programs. To be processed, these data and programs must first be loaded into primary storage.

secondary voltage—The voltage across the secondary winding of a transformer.



Secondary voltage.

secondary winding—Abbreviated sec. 1. The winding on the output side of a transformer. 2. A transformer winding that receives its energy by electromagnetic induction from a primary winding.

secondary X-rays—X-rays given off by an object irradiated with X-rays. Their frequency depends on the material in the object.

second breakdown—1. A condition in which the output impedance of a transistor changes almost instantaneously from a large value to a small limiting value. It may be distinguished from normal transistor operation by the fact that once it occurs, the base no longer controls normal collector characteristics. Second breakdown is associated with imperfections in the device structure, usually being more severe in multiple-diffused, high-speed devices. 2. Lateral current instability through a transistor when operating at relatively high voltages and current. It has its greatest effect under dc conditions, but falls off with increasing temperature and frequencies; the breakdown caused is usually permanent. 3. A potentially destructive phenomenon that occurs in all bipolar transistors. This phenomenon may occur when the transistor operates in the active region with a forward-biased emitter-to-base junction, or with the application of reverse bias during the cutoff mode of transistor operation.

second-channel attenuation—Alternate-channel attenuation. See also selectance, 2.

second-channel interference—Also called alternate-channel interference. Interference in which the extraneous power originates from an assigned (authorized) signal two channels away from the desired channel.

second detector—Also called a demodulator. In a superheterodyne receiver, the portion that separates the audio component from the modulated intermediate frequency.

second generation—In reference to computers, the period during which transistors took the place of vacuum tubes; the period began in the mid-1950s.

second-generation computer—A computer in which solid-state components are used.

second source—1. The manufacturer of a device, other than the original manufacturer. 2. A reference to the manufacture by a competitive company of a part that is electrically and mechanically identical to the original part.

second-time-around echo—An echo received after a time interval greater than the pulse interval.

section—1. A four-terminal network that cannot be divided into a cascade of two simpler four-terminal networks. 2. One individual span of a radio relay system;

the number of sections in a system is one more than the number of repeaters.

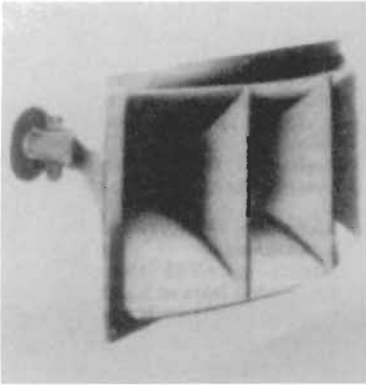
sectional center—A toll switching point to which are connected a number of primary outlets.

sectionalized vertical antenna—A vertical antenna separated into parts by insulators at one or more points along its length. When suitable reactances or driving voltages are placed across the insulated points, the current distribution is modified to give a more desirable radiation pattern in the vertical plane.

sectionalizing—Breaking up of a distribution feeder into smaller sections to minimize the extent of power interruption to customers.

sector—1. The smallest recordable unit on a CD. A disc can contain $[(75 \text{ sectors per second}) \times (60 \text{ seconds per minute}) \times (\text{number of minutes on disc})]$ sectors. The amount of data contained in the sector depends on the physical format and mode in which it is recorded; for regular CD-ROM (Mode 1) data, 2048 bytes (2 kilobytes) of data can fit. 2. A segment of a magnetic disk's track, typically occupied by one block of data. 3. The smallest contiguous storage area on a magnetic secondary storage medium. In microprocessor systems with flexible diskette drives as the secondary storage medium, sector size is typically 128 bytes.

sectoral horn—A horn with two parallel and two diverging sides.



Sectoral horn.

sector cable—A multiconductor cable in which the cross section of each conductor is essentially a sector of a circle, an ellipse, or some figure intermediate between them. Sector cables are used in order to make possible the use of larger conductors in a cable of given diameter.

sector conductor—A stranded conductor whose cross section is approximately the shape of a sector of a circle. A multiconductor insulated cable with sector conductors has a smaller diameter than the corresponding cable with round conductors.

sector display—A range-amplitude display used with a radar set. The antenna system rotates continuously, and the screen (of the long-persistence type) is excited only while the beam is within a narrow sector centered on the object.

sector scan—A scan in which the antenna oscillates through a selected angle.

sector scanning—Modified circular scanning in which only a portion of the plane or flat cone is generated.

secular variation—A slow variation in the strength of the earth's magnetic field.

secure mode—The condition of an alarm system in which all sensors and control units are ready to respond to an intrusion.

secure voice—Voice message that is scrambled or coded, therefore not transmitted in the clear.

SED—Abbreviation for spectral energy distribution.

Seebeck coefficient—The ratio of the open-circuit voltage to the temperature difference between the hot and cold junctions of a circuit exhibiting the Seebeck effect.

Seebeck coefficient of a couple—For homogeneous conductors, the limit, as the difference in temperature approaches zero, of the quotient of the Seebeck emf divided by the temperature difference between the junctions. By convention, the Seebeck coefficient of a couple is considered positive if, at the cold junction, the first named conductor has a positive potential with respect to the second. It is the algebraic difference between either the relative or absolute Seebeck coefficients of the two conductors.

Seebeck effect—1. The production of an electromotive force (emf) in a circuit composed of two dissimilar metals when their two junctions are at different temperatures. The emf is considered to be the resultant of the Peltier and Thomson emfs around the circuit. 2. Characteristic of dissimilar metals in thermoelectric solar cells whereby separate junctions exhibiting distinct temperatures transform incident voltage into a current.

Seebeck emf—Also called thermal emf. The emf produced by the Seebeck effect.

seed—A special single crystal from which large single crystals are grown by the Czochralski technique.

seed crystal—A crystal used to start the growing of a large semiconductor ingot.

seek—1. With reference to a computer, to look for data according to information given with respect to that data. 2. Moving a set of read/write heads so that one of them is over the desired track.

seek time—The time needed to position the head of a disk drive over the specified track.

segment—1. In a routine, the part short enough to be stored entirely in the internal storage of a computer, yet containing all the coding necessary to call in and jump automatically to other segments. 2. To divide a program into an integral number of parts, each of which performs a part of the total program and is short enough to be completely stored in internal memory.

segmental conductor—A round, stranded conductor composed of three or four sectors slightly insulated from one another. This construction has the advantage of lower ac resistance (less skin effect).

segmentation—A technique for managing variable-sized areas of memory, termed segments, that contain logical program parts.

segmented thermoelectric arm—A thermoelectric arm made up of two or more materials that have different compositions.

segmenting—See partitioning.

segment table—A table that describes all segments of a task and is used by the operating system for memory allocation, relocation, and paging.

seismic mass—The force-summing member for applying acceleration and/or gravitational force in an accelerometer.

seismic sensor—A sensor, generally buried under the surface of the ground for perimeter protection, that responds to minute vibrations of the earth generated as an intruder walks or drives within its detection range.

seismograph—An instrument for recording the time, direction, and intensity of earthquakes or of earth shocks produced by explosions.

seize—To access or connect to a communications circuit while at the same time making it busy to prevent intrusion.

selcal—Acronym for selective calling system. This system allows a teleprinter to be remotely controlled by a unique code.

selectance—1. A measure of the drop in response as a resonant device loses its resonance. It is the ratio of the amplitude of response at the resonant frequency to the response at some other specified frequency. 2. Often expressed as adjacent-channel attenuation (ACA) or second-channel attenuation (SCA). The reciprocal of the ratio of the sensitivity of a receiver tuned to a specified channel to its sensitivity at another channel a specified number of channels away.

selected mode—A mode of operation for an encoder selector circuit in which one set of brushes is selected to be read and another inhibited from being read; also a mode of operation for a system controlling several encoder outputs in which the encoder is selected to be read and all others inhibited from being read.

selection check—A verification of a computer instruction, usually automatic, to ensure that the correct register or device has been chosen.

selection ratio—The ratio of the least magnetomotive force used to select a cell or core to the maximum magnetomotive force used that is not intended to select a cell or core.

selection sort—A simple sorting algorithm for putting all the elements in a file in order.

selective—The characteristic of responding to a desired frequency to a greater degree than to other frequencies.

selective absorption—Absorption of rays of a certain group of frequencies only.

selective calling—1. A means of calling in which code signals are transmitted for the purpose of activating the automatic attention device at the station being called. 2. A type of operation in which the transmitting station can specify which of several stations on a line is to receive a message.

selective diffusion—The process in which specified isolated regions in a semiconductor material are doped. The components in a silicon integrated circuit are formed in this way.

selective dump—A dump of a selected area of internal computer storage.

selective fading—Fading in which the received signal does not have the same variation in strength for all frequencies in the band. Selective fading usually occurs during multipath transmission.

selective interference—Interference whose energy is concentrated within narrow frequency bands.

selective ringing—An arrangement used on telephone party lines so that only the bell of the called subscriber rings.

selective squelch—*See* squelch circuit.

selectivity—1. The characteristic that determines the extent to which the desired signal can be differentiated from disturbances of other frequencies. 2. A tuner's ability to discriminate between a wanted signal and an interfering signal on adjacent frequency settings of the tuning dial. It is the ratio (in decibels) of the signal strength that produces a standard output on the desired channel to the strength of a signal on a nearby channel needed to produce an output 30 dB below the standard level. Selectivity measurements usually refer to signals on the alternate channel (400 kHz from the desired channels in FM and 20 kHz in AM); selectivity measured on the adjacent channel (200 kHz for FM, 10 kHz for AM)

is usually lower. The higher the selectivity, the less interference there will be from signals on nearby channels, which is most important in crowded metropolitan areas. 3. The characteristic that determines the extent to which the desired frequency can be differentiated from other frequencies.

selectivity control—The control for making a receiver more selective.

select lines—In a core memory array, the wires that pass through magnetic cores and carry the selecting coincident currents.

selector pulse—A pulse used to identify one event of a series.

selector relay—A relay capable of automatically selecting one or more circuits.

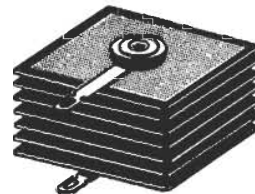
selector switch—A multiposition switch that permits one or more conductors to be connected to any of several other conductors.

selectron—A computer-memory tube capable of storing 256 binary digits and permitting very rapid selection and access.

selenium—A chemical element with marked photosensitive properties and a resistance that varies inversely with illumination. It is used as a rectifier layer in metallic rectifiers.

selenium cell—A photoconductive cell consisting of a layer of selenium on a substrate whose electrical resistance varies with the illumination falling on the cell. (Selenium cells have been largely replaced by photocells of one kind or another.)

selenium rectifier—A metallic rectifier in which a thin layer of selenium is deposited on one side of an aluminum plate and a highly conductive metal is coated over it. Electrons flow more freely from the coating to the selenium than in the opposite direction, thereby providing rectification.



Selenium rectifier.

self-adapting—Pertaining to the ability of a system to change its performance characteristics in response to its environment.

self-adaptive system—A system that can exhibit the qualities of reorganization and/or learning.

self-adjusting communication—*See* adaptive communication.

self-aligned thick oxide—A term used to describe a proprietary low-voltage, self-aligned gate process.

self-aligning-gate MOS—Abbreviated SAG MOS. 1. An MOS device in which a polycrystalline silicon layer is substituted for the usual aluminum metal gate. The key feature is a different processing technology in which the gate is automatically aligned. 2. A process in which materials like polycrystalline silicon or refractory metals are used in place of aluminum at the gate. These materials act as a mask and result in the gate being automatically aligned between source and drain regions.

self-balancing recorder—A recording device operating on the servomechanism principle.

self-bias—Also called automatic bias. The voltage developed by the flow of vacuum-tube current through a resistor in a grid or cathode lead.

self-capacitance—See distributed capacitance.

self-checking code—In computers, a code in which errors produce forbidden combinations. A single self-checking code produces a forbidden combination if a digit gains or loses a single bit. A double self-checking code produces a forbidden combination if a digit gains or loses either one or two bits, and so forth.

self-cleaning contact—See wiping contact.

self-complementing code—A machine language in which the code of the complement of a digit is the complement of the code of the digit.

self-contained instrument—An instrument that has all the necessary equipment built into the case or made a corporate part thereof.

self-demagnetization—The process by which a magnetized sample of magnetic material tends to demagnetize itself by virtue of the opposing fields created within it by its own magnetization. Self-demagnetization inhibits the successful recording of signal components having short wavelengths or sharp transitions.

self-diagnostic—The hardware and firmware within a controller that allows it to continuously monitor its own status and indicate any fault that could occur within it.

self-discharge—The loss of useful capacity of a cell or battery in storage due to internal chemical reactions; for example, chemicals evaporating, or electrolyte slowly reacting with the anode even on open circuit.

self-energizing—A type of electrostatic phone that uses the stepped-up signal voltage to supply the dc polarizing voltage required for operation.

self-erasure—The tendency for strongly magnetized areas of the tape coating to erase adjacent areas of opposite-polarity magnetization. This is a major cause of loss of high frequencies at reduced tape speeds.

self-excitation—The supplying of required exciting voltages by a device itself rather than from an external source.

self-excited—A type of generator that provides the current for its own field coils.

self-excited oscillator—An oscillator that operates without external excitation and solely by the direct voltages applied to the electrodes. It depends on its resonant circuits for frequency determination (i.e., not crystal controlled).

self-extinguishing—Material that ignites and burns when exposed to flame or elevated temperature, but which stops burning when the flame or high temperature is removed.

self-focused picture tube—A television picture tube with an automatic electrostatic focus designed into the electron gun.

self-generating transducer—A transducer that requires no external electrical excitation to provide an output.

self-healing—1. The characteristic of metallized capacitors by which faults or shorts occurring during operation are removed, or healed, by an internal clearing action, and the part continues to function. See also clearing, 1. 2. The process by which the electrical properties of the capacitor, after local breakdown of the dielectric, are instantaneously and essentially restored to the values before the breakdown.

self-healing capacitor—A capacitor that restores itself to operation after a breakdown caused by excessive voltage. The electrode layer is so thin that a small part of the energy released in a breakdown condition is quite sufficient to evaporate the metal layer around the

breakdown point and, thus, to terminate the breakdown in the shortest possible time. Only a small healed area is produced in the dielectric, and the capacitor voltage only drops to a minimal extent during the breakdown.

self-heated thermistor—A thermistor whose body temperature is significantly higher than the temperature of its ambient medium as a result of the power being dissipated in it.

self-heating coefficient of resistivity—The maximum change in resistance due to temperature change caused by power dissipation, at constant ambient temperature. Usually expressed in percent or per-unit (ppm) change in nominal resistance per watt of dissipation. This parameter is actually the product of the power coefficient and the resistor temperature coefficient.

self-impedance—At any pair of terminals of a network, the ratio of an applied potential difference to the resultant current at these terminals (all other terminals open).

self-inductance—1. The property that determines the amount of electromotive force induced in a circuit whenever the current changes in the circuit. 2. At any pair of terminals of a network, the ratio of an applied potential difference to the resultant current at these terminals, all other terminals being open.

self-induction—The property that causes a counter-electromotive force to be produced in a conductor when the magnetic field produced by the conductor collapses or expands with a change in current.

self-inductor—An inductor used for changing the self-inductance of a circuit.

self-instructed carry—A system of executing the carry process in a computer by allowing information to propagate to succeeding places as soon as it is generated, without receipt of a specific signal.

self-latching relay—A relay in which the armature remains mechanically locked in the energized position until deliberately reset.

self-optimizing communication—See adaptive communication.

self-organizing—Having to do with the ability of a system to arrange its own internal structure.

self-organizing machines—Machines that can recognize, or learn to recognize, such stimuli as patterns, characters, and sound, and which can then adapt to a changing environment.

self-passivating glaze—The glassy material in a thick-film resistor that comes to the surface and seals the surface against moisture.

self-powered—Equipment containing its own power supply. It may be either a combination of wet and dry cells, or dry cells in conjunction with a spring-driven motor.

self-pulse modulation—Modulation accomplished by using an internally generated pulse. See also blocking oscillator, 1.

self-pulsing—A special type of grid-pulsing circuit that automatically stops and starts the oscillations at the pulsing rate.

self-quenched counter tube—A radiation-counter tube in which reignition of the discharge is inhibited.

self-quenched detector—A superregenerative detector in which the grid-leak grid-capacitor time constant is sufficiently large to cause intermittent oscillation above audio frequencies. As a result, normal regeneration is stopped just before it spills over into a squealing condition.

self-quenching oscillator—An intermittent self-oscillator producing a series of short trains of rf oscillations separated by intervals of quiescence. The quiescence

is caused by rectified oscillatory currents, which build up to the point at which they cut off the oscillations.

self-rectifying X-ray tube—An X-ray tube operating with an alternating anode potential.

self-refresh—In a dynamic RAM, a method of asynchronously refreshing during a battery backup mode of operation with only one control pin held active.

self-regulation—The tendency of a component or system to resist change in its condition or state of operation.

self-repeating timer—A form of time-delay circuit in which relay contacts are used to restart the time delay.

self-reset—Automatically returning to the original position when normal conditions are resumed (applied chiefly to relays and circuit breakers).

self-saturating rectifier—A half-wave rectifying-circuit element connected in series with the output windings of a saturable reactor in a self-saturating magnetic-amplifier circuit.

self-saturation—The saturation obtained in a magnetic amplifier by rectifying the output current of a saturable reactor.

self-screening range—The range at which a target can be detected by a radar in the midst of its jamming mask, with a certain specified probability.

self-selecting V scan—The V-scan method of reading a polystrophic code (primarily the binary code), in which diode logic circuits are used internally in the encoder to perform the necessary bit-to-bit selection to prevent ambiguity in the encoder output data.

self-starting synchronous motor—A synchronous motor provided with the equivalent of a squirrel-cage winding so it can be started like an induction motor.

self-stopping modulo- n counter—A counter having n distinct states that stops when it reaches a predetermined maximum number; it then does not accept count pulses until it is reset to a number less than the maximum number.

self-sustained oscillations—Oscillations maintained by the energy fed back from the output to the input circuit.

self-testing—The ability of a piece of equipment to automatically verify the proper operation of its components or subsystems.

self-threading reel—A device for spooling and storing tape; in particular, one that does not require external aid to affix or start the first turn of tape on its winding surface or hub. Flanges on such reels can be continuous and free of windows; winding surfaces are continuous and free of distortion-producing threading slots.

self-wiping contact—See wiping contact.

selsyn—Electrical remote-indicating instrument operating on direct current, in which the angular position of the transmitter shaft carrying a contact arm moving on a resistance strip controls the pointer on the indicator dial.

SEM—1. Abbreviation for standard electronic module. A subassembly configuration format that meets a particular U.S. Navy set of specifications. 2. Abbreviation for scanning electron microscope.

semantics—The relationships between symbols and their meanings.

semaphore—See lock byte.

semiaactive homing guidance—A system of homing guidance in which radiations used by the receiver in the missile are reflected from a target being illuminated by an outside source.

semiaactive repeater—A communications satellite that uses a minimum of onboard electronics to take a modulated signal beamed at it from a ground station and

transfer its information (modulation) into an unmodulated beam (on a different frequency) set up by the receiving station. For this transfer it uses Van Atta or other directive arrays and nonlinear elements.

Semiautomatic Ground Environment—Abbreviated SAGE. An air-defense system in which data from air surveillance is processed for transmission to computers at direction centers.

semiautomatic keying circuits—Mechanization that provides torn-tape switching systems in teleprinter links. Incoming and outgoing messages are placed on tapes that are inserted manually into a distributor that provides automatic mechanical keying of the circuit.

semiautomatic message switching center—A center at which messages are routed by an operator on the basis of information contained in them.

semiautomatic phonograph—A phonograph having automatic arm return and motor shutoff at the end of a record, but no automatic start and tonearm setdown at the beginning of play.

semiautomatic starter—A starter in which some of the operations are not automatic, but selected portions are automatic.

semiautomatic tape relay—A method of communication whereby messages are received and retransmitted in teletypewriter tape form involving manual intervention in the transfer of the tape from the receiving reperforator to the automatic transmitter.

semiautomatic telephone system—A telephone system in which operators receive orders from the calling parties verbally, but use automatic apparatus in making connections.

semiconducting material—A solid or liquid having a resistivity midway between that of an insulator and a metal.

semiconductor—1. A class of materials, such as silicon and germanium, whose electrical properties lie between those of conductors (such as copper and aluminum) and insulators (such as glass and rubber), in which the electrical charge carrier concentration increases with increasing temperature over some temperature range. Over most of the practical temperature range, the resistance has a negative temperature coefficient. Certain semiconductors possess two types of carriers: negative electrons and positive holes. The charge carriers are usually electrons, but there may be also some ionic conductivity. 2. An electronic device whose main functioning parts are made from semiconductor materials. Examples include germanium, lead sulfide, lead telluride, selenium, silicon, and silicon carbide. Used in diodes, photocells, thermistors, and transistors. 3. A device (or material) with an electrical conductivity that lies between metal conductors and insulator devices. 4. A material whose resistivity is between that of insulators and conductors. The resistivity is often changed by light, heat, and electric field, or a magnetic field. Current is often achieved by transfer of positive holes as well as by movement of electrons. 5. A material that exhibits relatively high resistance in a pure state and much lower resistance when it contains small amounts of certain impurities. The term is also used to denote electronic devices made from semiconductor materials.

semiconductor carrier—A permanent protective structure that provides for mounting and for electrical continuity in application of a semiconductor chip to a major substrate.

semiconductor chip—A single piece of semiconductor material of any dimension.

semiconductor device—1. A device in which the characteristic distinguishing electron conduction takes place within a semiconductor material, ranging from the

single-unit transistor to multiple-unit devices such as the semiconductor rectifier. Other devices are diodes, photocells, thermistors, and thyristors. 2. A device in which n-type and p-type materials are used in combination to obtain specific characteristics for controlling the flow of current. 3. A device, including its encapsulation and terminals, whose essential characteristics are governed by the flow of charge carriers within a semiconductor material.

semiconductor diode — 1. A device consisting of n-type and p-type semiconductor material joined together to form a pn junction, which passes current in the forward direction (from anode to cathode) and blocks current in the reverse direction. High reverse voltages, such as transients greater than a specified limit, can destroy the junction due to excessive reverse leakage currents. *See also* crystal diode. 2. A light-emitting diode that emits coherent light by suitably arranged geometry. Gallium arsenide is used for lasers of this type. 3. A two-electrode semiconductor device that conducts current more easily in one direction.

semiconductor-diode parametric amplifier — A parametric amplifier using one or more varactors.

semiconductor ignition system — An ignition system for internal combustion engines that employs solid-state semiconductors for switching purposes.

semiconductor integrated circuit — Abbreviated SIC. 1. Complex circuits fabricated by suitable and selectively modifying areas on and within a wafer of semiconductor material to yield patterns of interconnected passive as well as active elements. The circuit may be assembled from several chips and use thin-film elements or even discrete components to achieve a specified performance when the necessary device parameters cannot be achieved by materials modification. 2. The physical realization of a number of electric elements inseparably associated on or within a continuous body of semiconductor material to perform the function of a circuit.

semiconductor intrinsic properties — Properties of a semiconductor that are characteristic of the ideal crystal.

semiconductor junction — The region of transition between semiconducting regions of different electrical properties, usually between p-type and n-type materials.

semiconductor laser — 1. A device in which laser action takes place through stimulated recombination of free electrons in the conduction band with holes in the valence band of a direct-gap semiconductor such as gallium arsenide. 2. A light-emitting diode that uses stimulated emission to produce a coherent-light output. *See also* diode laser.

semiconductor lead wire — Fine wire used to connect semiconductor chips to substrate patterns, packages, other chips, etc. Usually made from an aluminum alloy or gold.

semiconductor material — 1. A material in which the conductivity ranges between that of a conductor and an insulator. The electrical characteristics of semiconductor materials such as silicon are dependent on the small amounts of added impurities, or dopants. 2. A chemical element, such as silicon or germanium, that has a crystal lattice whose atomic bonds are such that the crystal can be made to conduct an electric current by means of free electrons or holes.

semiconductor memory — 1. A memory whose storage medium is a semiconductor circuit. Often used for high-speed buffer memories and for read-only memories. 2. A memory in which semiconductors are used as the storage elements; characterized by low-to-moderate cost storage and a wide range of memory operating speed,

from very fast to relatively slow. Almost all semiconductor memories are volatile. 3. A memory with storage elements formed by integrated semiconductor devices, as opposed to a memory composed of ferrite cores. Semiconductor read/write memories are characterized by low cost, wide speed ranges, and data volatility. Semiconductor read-only memories are nonvolatile. 4. A computer memory that uses silicon integrated-circuit chips.

semiconductor photodiode — A semiconductor diode utilizing the photoelectric effect.

semiconductor rectifier diode — A semiconductor diode designed for rectification and including its associated mounting and cooling attachments if integral with it.

semicustom IC — An LSI circuit that incorporates either linear or digital components. Semicustom ICs are designed to serve as replacements for small- to medium-scale ICs and are based on the concept of integrating extremely complex functions onto a single IC to fulfill a particular custom function. One semicustom IC may replace anywhere from several to more than 100 individual ICs. The semicustom IC, initially processed up to, but not including, the interconnect level, is adapted to specific requirements with relative ease through patterning of the metal interconnect layer. By connecting the transistors (which may number in the thousands) on a single IC in different ways, various functions, such as flip-flops, gates, adders, and parity control, are created. These blocks are then interconnected to form an entire system function on the chip.

semicustom large-scale integrated circuit — *See* gate array, 3.

semicustom logic — Chips whose logic functions can be determined in the final stages of manufacturing, such as PLAs and gate arrays.

semidirectional microphone — A microphone whose field response is determined by the angle of incidence in part of the frequency range but is substantially independent of the angle of incidence in the remaining part.

semiduplex — In a communications circuit, a method of operation in which one end is duplex and one end simplex. This type of operation is sometimes used in mobile systems, with the base station duplex and the mobile station or stations simplex. A semiduplex system requires two operating frequencies.

semimagnetic controller — An electrical controller whose basic functions are not all performed by electromagnets.

semimetals — Materials, such as bismuth, antimony, and arsenic, having characteristics that class them between semiconductors and metals.

semiremote control — Radio-transmitter control performed near the transmitter by devices connected to but not an integral part of the transmitter.

semiselective ringing — An arrangement in which the bells of two stations on a telephone party line are rung simultaneously; differentiation is made by the number of rings.

semitone — Also called half step. The interval between two sounds. Its basic frequency ratio is equal to approximately the twelfth root of 2.

semitransparent photocathode — A photocathode in which radiant flux incident on one side produces photoelectric emission from the opposite side.

sender — That part of an automatic-switching telephone system that receives pulses originated by a dial or other source and, in accordance with the pulses received, controls the further operations necessary to establish the connection.

sending-end impedance — Also called the driving-point impedance. The ratio of an applied potential difference of a transmission line to the resultant current at the point where the potential difference is applied.

sending filter — A filter used at the transmitting terminal to restrict the transmitted frequency band.

sensation level — See level above threshold.

sense — 1. In navigation, the relationship between the change in indication of a radionavigational facility and the change in the navigational parameter being indicated. 2. In some navigational equipment, the property of permitting the resolution of 180° ambiguities. 3. To examine or determine the status of some system components. 4. To read holes in punched tape or cards.

sense amplifier — 1. A circuit used to sense low-level voltages such as those produced by magnetic or plated-wire memories and to amplify these signals to the logic voltage levels of the system. 2. A circuit used in communications-electronics equipment to determine a change of phase or voltage and to provide an automatic control function.

sense finder — In a direction finder, that portion which permits determination of direction without 180° ambiguity.

sense-reversing reflectivity — The characteristic of a reflector that reverses the sense of an incident ray. (For example, a perfect corner reflector is invisible to a circularly polarized radar because it reverses the sense.)

sense step — See secondary calibration.

sense switch — One of a series of switches on the console of the digital computer that permits the operator to control some parts of a program externally.

sense wire — A wire threaded through the core of a magnetic memory to detect whether a logical 1 or 0 is stored in the core when the core is interrogated by a read pulse. This technology is no longer in use.

sensing — 1. The process of determining the sense of an indication. 2. A technique used in a power supply regulator for monitoring the output voltage or current. In local sensing, the monitor points are the output terminals. In remote sensing, the monitor points are located at appropriate locations in the circuit being powered, connected by wire to sensing input terminals on the supply.

sensing element — See primary detector.

sensing field — The zone in which an object can be sensed by a proximity switch.

sensistor — A silicon resistor whose resistance varies with temperature, power, and time.

sensitive relay — 1. A relay requiring only a small current. It is used extensively in photoelectric circuits. 2. Any of a number of different types of relays requiring very low pickup power. Generally considered to be one requiring less than 100 milliwatts of pickup power.

sensitive volume — In a radiation-counter tube, the portion responding to a specific radiation.

sensitivity — 1. The minimum input signal required in a radio receiver or similar device to produce a specified output signal having a specified signal-to-noise ratio. This signal input may be expressed as power or voltage at a stipulated input network impedance. 2. Ratio of the response of a measuring device to the magnitude of the measured quantity. It may be expressed directly in divisions per volt, milliradians per microampere, etc., or indirectly by stating a property from which sensitivity can be computed (e.g., ohms per volt for a stated deflection). 3. The signal current developed in a camera tube per unit incident radiation density (i.e., per watt per unit area). Unless otherwise specified, the radiation is understood to be that of unfiltered incandescent source of 2854 K, and its density, which is generally measured in watts per unit

area, may then be expressed in lumens per foot. 4. The degree of response of an instrument or control unit to a change in the incoming signal. 5. In tape recording, the relative intensity of the magnetic signal recorded by a magnetizing field of a given intensity. 6. A measurement of the electrical output of a microphone for a given sound pressure level at its diaphragm. 7. The smallest input change that a DMM is able to display. It is equal to the least significant digit on the lowest measurement range. For example, a three-digit DMM with a 100-mV range has 100 μ V sensitivity. 8. Generally expressed in dBm at a specified impedance (usually 600 ohms), sensitivity is a measure of the lowest DTMF signal level that a receiver can detect. It represents an absolute threshold below which detection of a single frequency is not generated. 9. Measure of the ability of a device or circuit to react to a change in some input. 10. In television, a factor expressing the incident illumination on a specified scene required to produce a specified picture signal at the output terminals of a television camera. 11. A measure of relative output for a given input of a tape, microphone, etc. 12. Characteristic of a receiver that determines the minimum input signal strength required for a given signal output. Sensitivity is usually measured in microvolts (μ V).

sensitivity adjustment — Also called span adjustment. The control of the ratio of output signal to excitation voltage per unit measurand. Generally accomplished in a system by changing the gain of one or more amplifiers. The practice of placing excitation control components (such as potentiometers or rheostats) in series with the excitation to a transducer is a sensitivity adjustment for the system. However, in the latter case no significant change is introduced in the output-to-input ratio of the transducer.

sensitivity control — The control that adjusts the amplification of the radio-frequency amplifier stages and thereby makes the receiver more sensitive.

sensitivity-time control — Also called gain-time control or time gain. The portion of a system that varies the amplification of a radio receiver in a predetermined manner.

sensitizing (electrostatography) — The establishing of an electrostatic surface charge of uniform density on an insulating medium.

sensitometer — An instrument used to measure the sensitivity of light-sensitive materials.

sensitometry — Measurement of the light-response characteristics of photographic film.

sensor — 1. In a navigational system, the portion that perceives deviations from a reference and converts them into signals. 2. A component that converts mechanical energy into an electrical signal, either by generating the signal or by controlling an external electrical source. 3. See primary detector. 4. An information-pickup device. 5. A transducer designed to produce an electrical output proportional to some time-varying quantity, as temperature, illumination, pressure, etc. 6. The component of an instrument that converts an input signal into a quantity that is measured by another part of the instrument. 7. Any device that can detect the presence of, or a change in the level of, light, sound, capacitance, magnetic field, etc. 8. A device or component that reacts to a change; the reaction is then used to cause a control or instrument to function. For example, a thermistor changes resistance as temperature changes, and the resistance changes can be used in an electric circuit to vary current. 9. A transducer that converts a parameter at a test point to a form suitable for measurement by the test equipment. 10. A sensing element. The basic element of a transducer that usually changes some physical parameter to an electrical

signal. 11. A device that is designed to produce a signal or offer indication in response to an event or stimulus within its detection zone. 12. A component that provides an electrical signal in response to a specific physical or chemical stimulus such as heat, pressure, magnetic field, or a particular chemical vapor. Microsensors are fabricated using processes similar to those for manufacturing ICs, or extensions of such processes. Integrated microsensors incorporate an integrated circuit on the same die as that used for the sensor element.

sensory robot—A computerized robot with one or more artificial senses, usually sight or touch.

sentinel—1. A symbol marking the beginning or end of some piece of information in digital-computer programming. 2. *See* tag.

separate excitation—Excitation in which generator field current is provided by an independent source, or motor field current is provided from a source other than the one connected across the armature.

separately instructed carry—Executing the carry process in a computer by allowing carry information to propagate to succeeding places only when a specific signal is received.

separation—The degree to which two stereo signals are kept apart. Stereo realism is dependent on the successful prevention of their mixture before reaching the output terminals of the power amplifier. Tape systems have a separation capability inherently far superior to that of the disc systems.

separation circuit—A circuit that separates signals according to their amplitude, frequency, or some other selected characteristic.

separation filter—A combination of filters used to separate one band of frequencies from another—often, to separate carrier and voice frequencies for transmission over individual paths.

separation loss—The loss that occurs in output when the surface coating of a tape fails to make perfect contact with the surfaces of either the record or reproduce head.

separator—1. An insulating sheet or other device employed in a storage battery to prevent metallic contact between plates of opposite polarity within a cell. 2. An insulator used in the construction of convoluted wound capacitors. 3. *See* delimiter.

septate coaxial cavity—A coaxial cavity with a vane or septum added between the inner and outer conductors. The result is a cavity that acts as if it had a rectangular cross section bent transversely.

septate waveguide—A waveguide with one or more septa placed across it to control microwave power transmission.

septum—A thin metal vane that has been perforated with an appropriate wave pattern. It is inserted into a waveguide to reflect the wave. Plural: septa.

sequence—1. The order in which objects or items are arranged. 2. To place in order. 3. A succession of terms so related that each may be derived from one or more of the preceding terms in accordance with some fixed law.

sequence checking routine—A checking routine that examines every instruction executed and prints certain data concerning this check.

sequence control—Automatic control of a series of operations in a predetermined order.

sequencer—1. The component of a processor that controls the program flow by implementing branches for subroutine processing and handling interrupts. 2. A device or computer program that records, edits, and plays back MIDI data much like a word processor for music, such that you can fix wrong notes or lengthen or shorten notes.

3. A mechanical or electronic device that may be set to initiate a series of events and to make the events follow in sequence. 4. A circuit that pulls information from the control store memory, based on external conditions. 5. In a bit-slice system, the module in charge of providing the next microprogram address to the microprogram memory. Essentially a complex multiplexer, but may include stack facilities and a loop counter.

sequence relay—A relay that controls two or more sets of contacts in a predetermined sequence.

sequencer register—In a computer, a counter that is pulsed or reset following the execution of an instruction to form the new memory address that locates the next instruction.

sequence timer—A succession of time-delay circuits arranged so that completion of the delay in one circuit initiates the delay in the following circuit.

sequencing equipment—A special selecting device by means of which messages received from several teletypewriter circuits may be subsequently selected and retransmitted over a smaller number of trunks or circuit.

sequency of operation—A detailed written description of the order in which electrical devices and other parts of the equipment should function.

sequential access—1. An access mode in which records are retrieved in the same order in which they were written. Each successive access to a file refers to the next record in the file. 2. A term used to describe files such as magnetic tape that must be searched sequentially to find any desired record. 3. Computer access method in which a word is accessed by scanning sequential blocks or records. For example: a tape. 4. Data on storage, such as magnetic tape, that must be searched serially from the beginning to find any desired record.

sequential-access file—A type of file structure in which data may only be accessed sequentially, one record at a time. Data stored on magnetic tape is an example of a sequential file.

sequential-access memory—Abbreviated SAM.

1. A serial-type memory in which words are selected in a fixed order. The addressing circuit steps from word to word in a predetermined order, with the result that the access time for the stored information (words) is variable. 2. A method of information retrieval in which the complete memory is scanned and each word is, in its turn, read out, worked on, then rewritten.

sequential circuit—A digital circuit that changes state according to an input signal (normally under clock control); it must be tested with a sequence of signals.

sequential color television—A color television system in which the three primary colors are transmitted in succession and reproduced on the receiver screen in the same manner.

sequential color transmission—The transmission of television signals that originate from variously colored parts of an image in a particular sequential order.

sequential computer—A computer in which events occur in time sequence with little or no simultaneous occurrence or overlap of events.

sequential control—Digital-computer operation in which the instructions are set up in sequence and fed to the computer consecutively during the solution of a problem.

sequential element—A device having at least one output channel and one or more input channels, all characterized by discrete states, such that the state of each output channel is determined by the previous states of the input channels.

sequential interlace—A method of interlacing in which the lines of one field are placed directly under the corresponding lines of the preceding field.

sequential lobing—A direction-determining technique utilizing the signals of overlapping lobes existing at the same time.

sequential logic—1. A circuit arrangement in a computer in which the output state is determined by the previous state of the input. *See also* combinatorial logic. 2. Part of a circuit in which the output values are a function of the inputs and data stored within the circuit.

sequential logic element—A device that has one or more output channels and one or more input channels, all of which have discrete states, such that the state of each output channel depends on the previous states of the input channel.

sequential operating connector—A form of connector that has two or more groups of contacts that open and close in a predetermined sequence. For example, a connector that is designated for use with ground connections, power distribution, and signal circuits. Operates in such a way that when the connector is closed, the ground contacts close first, power contacts second, and signal contacts last. This sequence is reversed when the connector is opened.

sequential operation—The carrying out of operations one after the other.

sequential relay—A relay that controls two or more sets of contacts in a predetermined sequence.

sequential sampling—Sampling inspection in which the decision to accept, reject, or inspect another unit is made following the inspection of each unit.

sequential scan—A system of TV scanning in which each line of the raster is scanned sequentially.

sequential scanning—In television, rectilinear scanning in which the distance from center to center of successively scanned lines is equal to the nominal line width.

sequential switcher—A device that automatically permits the viewing of pictures from a number of CCTV cameras on one CCTV monitor in a selected sequence.

sequential timer—A timer in which each interval is initiated by the completion of the preceding interval. All intervals may be independently adjusted.

sequential with memory—*See* SECAM.

serial—1. Pertaining to time-sequential transmission of, storage of, or logical operations on the parts of a word in a computer—the same facilities being used for successive parts. 2. The technique for handling a binary data word that has more than one bit. The bits are acted upon one at a time, analogous to a parade passing a review point. 3. Typically refers to a port on a computer for transmitting one bit at a time. Modems and mice typically connect to a serial port.

serial access—1. Pertaining to transmission of data to or from storage in a sequential or consecutive manner. 2. Pertaining to the process in which information is obtained from or placed into storage with the time required for such operations dependent on the location of the information most recently obtained or placed in storage. *See also* random access.

serial adder—A device in which additions are performed in a series of steps; the least significant addition is performed first, and progressively more significant additions are performed in order until the sum of the two numbers is obtained.

serial arithmetic unit—In a computer, a unit in which the digits are operated on sequentially. *See also* parallel arithmetic unit.

serial bit—Pertaining to computer storage in which the individual bits making up a word appear in time sequence.

serial computer—A computer having a single arithmetic and logic unit.

serial counter—Also called ripple-through counter. A counter in which each flip-flop cannot change state until after the preceding flip-flop has changed state; relatively long delays after an input pulse is applied to the counter can occur before all flip-flops reach their final states.

serial data—Data transmitted sequentially, one bit at a time.

serial digital computer—A computer in which the digits are handled serially. Mixed serial and parallel machines are frequently called serial or parallel, according to the way the arithmetic processes are performed. An example of a serial digital computer is one that handles decimal digits serially, although the bits that comprise a digit might be handled either serially or in parallel. *See also* parallel digital computer.

serial interface—1. A data channel that transfers digital data (1s and 0s) in a serial fashion, one bit after another. Serial interfaces save space by requiring fewer lines compared with parallel interfaces, but at the sacrifice of data transfer speeds. 2. A port that sends or receives the eight bits in each byte one by one, much like beads on a string. Printers located far from a computer usually require a serial interface.

serial I/O—A method of data transfer between a computer and a peripheral device in which data is transmitted for input to the computer (or output to the device) bit by bit over a single circuit.

serialize—To convert from parallel-by-bit to serial-by-bit.

serially reusable routine—A computer routine in main storage that can be used by another task following conclusion of the current use.

serial memory—1. A memory in which information is stored in series and reading or writing of information is done in time sequence, as with a shift register. Compared with a RAM, a serial memory has slow to medium speed and lower cost. *See* sequential-access memory. 2. A memory whose contained data is accessible only in a fixed order, beginning at some prescribed reference point. Data in any particular location is not available until all data ahead of that location has been read. Such a memory is inherently slow compared with a random-access memory.

serial mode—A type of computer operation that is performed bit by bit, generally with the least significant bit handled first. Read-in and readout are accomplished bit after bit by shifting the binary data through the register.

serial operation—1. In a digital computer, information transfer such that the bits are handled sequentially, rather than simultaneously as they are in parallel operation. Serial operation is slower than parallel operation, but it is accomplished with less complex circuitry. 2. Type of information transfer within a programmable controller whereby the bits are handled sequentially rather than simultaneously, as they are in parallel operation. Serial operation is slower than parallel operation for equivalent clock rate. However, only one channel is required for serial operation.

serial-parallel—Having the property of being partially serial and partially parallel.

serial port—A method of data communication in which bits of information are sent consecutively through one wire.

serial printer—A device that can print characters one at a time across a page.

serial processing—The sequential or consecutive execution of more than one process into a single device such as a channel or processing unit. Opposed to parallel processing.

serial programming—Programming of a digital computer in such a manner that only one arithmetical or logical operation can be executed at one time.

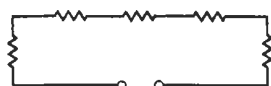
serial storage—1. In a computer, storage in which time is one of the coordinates used in the location of any given bit, character, or word. 2. A storage media organization in which data or text is serially recorded one character or text block after another. Text access points are retrieved by serially searching through the medium (usually a magnetic-tape cassette or cartridge).

serial transfer—Data transfer in which the characters of an element of information are transferred in sequence over a single path.

serial transmission—1. Information transmission in which the characters of a word are transmitted in sequence over a single line. 2. The transmission of a character's bits one at a time (implies a single transmission pathway). 3. A method of transferring information in which the code elements or pulses are sent sequentially, one after another. 4. Moving data in sequence one at a time, as opposed to parallel transmission.

series—1. The connecting of components end to end in a circuit, to provide a single path for the current. 2. An indicated sum of a set of terms in a mathematical expression (e.g., in an alternating or arithmetic series).

series circuit—1. A circuit in which resistances or other components are connected end to end so that the same current flows throughout the circuit. 2. A circuit in which the current has only one path to follow. 3. An electric circuit in which all the receptive devices are arranged in succession, as distinguished from a parallel circuit. The same current flows through each part of the circuit.



Series circuit.

series connection—A way of making connections so as to form a series circuit.

series excitation—The field excitation obtained in a motor or generator by allowing the armature current to flow through the field winding.

series-fed vertical antenna—A vertical antenna that is insulated from ground and energized at the base.

series feed—The method by which the dc voltage to the plate or grid of a vacuum tube is applied through the same impedance in which the alternating current flows.

series field—In a machine, the part of the total magnetic flux due to the series winding.

series-gate noise limiter—*See* noise limiter.

series loading—Loading in which reactances are inserted in series with the conductors of a transmission circuit.

series modulation—Modulation in which the plate circuits of a modulating tube and a modulated amplifier tube are in series with the same plate-voltage supply.

series motor—Also called series-wound motor. A motor in which the field and armature circuits are connected in series. In small motors with laminated field frames, the performance will be similar when operated on direct current or alternating current. For this reason, the series motor is frequently called a universal motor. A series motor has a high starting torque, but its speed varies with the load.

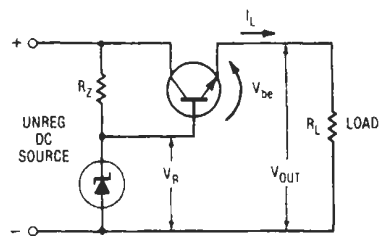
series operation—The connection of two or more power supplies together to obtain an output voltage of the combination equal to the sum of the individual supplies. A common current passes through all the supplies.

series-parallel network—Any network that contains only resistors, inductors, and capacitors and in which successive branches are connected in series and/or in parallel.

series-parallel switch—A switch that changes the connections of lamps or other devices from series to parallel or vice versa.

series peaking network—*See* peaking network.

series regulator—A device that is placed in series with a source of power and is able to automatically vary its series resistance, thereby controlling the voltage or current output.



Series-regulated power supply.

series resistance—Any sum of resistances installed in sequential order within one circuit.

series resistor—A resistor generally used for adapting an instrument so that it will operate on some designated voltage or voltages. It forms an essential part of the voltage circuit and may be either internal or external to the instrument.

series resonance—The condition existing in a circuit when the source of electromotive force is in series with an inductance and capacitance whose reactances cancel each other at the applied frequency, thereby reducing the impedance to minimum.

series-resonant circuit—A circuit in which an inductor and capacitor are connected in series and have values such that the inductive reactance of the inductor will be equal to the capacitive reactance of the capacitor at the desired resonant frequency. At resonance, the current through a series-resonant circuit is at maximum.

series-shunt network—*See* ladder network.

series T-junction—*See* E-plane T-junction.

series winding—In a motor or generator, a field winding that carries the same current as the armature; i.e., this winding is in series with the armature rather than in parallel with it. Series-wound motors are used in fractional-horsepower ac-dc applications, such as fans and electric mixers. Their other chief use is in heavy-duty dc traction equipment, such as electric locomotives, because of their extremely high starting torque.

series wound—Characteristic of a generator or motor whose armature and field windings are connected in series.

series-wound motor—A commutator motor with field and armature circuits in series. *See also* Series motor.

serpentine cut—A trim cut in a film resistor that follows a serpentine or wiggly pattern to effectively increase the resistor length and increase resistance.

serrated pulse—A vertical synchronizing pulse divided into a number of small pulses, each acting for the duration of half a line in a television system.

serrated rotor plate—Also called a slotted or split rotor plate. A rotor plate with radial slots that permit different sections of the plate to be bent inward or outward

so that the total capacitance of a variable-capacitor section can be adjusted during alignment.

serration—1. The sawtooth appearance of vertical and near-vertical lines in a television picture. This is caused by their starting at different points during the horizontal scan. 2. A designed irregular surface used as a reservoir to retain excess infiltrating material and/or multiple points to obtain high-current-density resistance welding or resistance brazing.

serrodyne—A frequency translator or frequency converter based on linear sawtooth modulation of phase shift or time delay. One convenient modifiable device for serrodyne use is a traveling-wave tube, which provides gain as well as frequency translation.

serve—1. With reference to cable construction, a type of separator applied directly over the conductor or conductors. The serve may consist of one or more materials such as paper, cotton, silk, nylon, or rayon. These materials may be applied spirally or laterally. 2. A filament or group of filaments, such as fibers or wires, wound around a central core.

server—1. A computer on a network that serves as a central repository for data and programs and which can be accessed over the network by other computers, called clients. 2. A computer or processor that holds applications, files, or memory shared by users on a network. 3. A computer, or a software package, that provides a specific kind of service to allow client software to run on other computers. The term can refer to a particular piece of software, such as a WWW server, or to the machine on which the software is running. A single server could have several different server software packages running on it, thus providing many different services to clients on the network.

server PC—Microcomputer used by a network as a source of disk drives and information.

service—1. A function offered by some part of an open system to communicating application processes. 2. The conductors and equipment for delivering energy from the electricity supply system to the wiring system of the premises served.

serviceability—Those properties of an equipment design that facilitate service and repair in operation.

service area—1. The area within which a navigational aid is of use. 2. The area surrounding a broadcasting station where the signal is strong enough for satisfactory reception at all times (i.e., not subject to objectionable interference or fading).

service band—The band of frequencies allocated to a class of radio service.

service channel—A band of frequencies, usually including a voice channel, utilized for maintenance and fault indication on a communication system.

service circuit—An interconnecting circuit in a switching network that may be connected to lines or trunks as required to perform various functions, such as dial pulse detection and audible ringing.

service conductors—The supply conductors that extend from the street main or from the transformers to the service equipment of the premises served.

service drop—The overhead service conductors from the last pole or other aerial support to and including the splices or taps, if any, connecting to the service-entrance conductors at the premises served.

service entrance—The conductors and equipment used for delivering energy from the utility pole to the premises.

service life—1. The period of time during which a device is expected to perform in a satisfactory manner. 2. The length of time a primary cell or battery needs to

reach a specified final electrical condition on a service test that duplicates normal usage.

service oscillator—See rf signal generator.

service provider—A company that provides Internet access. For end users, this service can be as simple as providing Internet e-mail accounts, access to Usenet news groups, ftp, and web browser access via the service provider's servers. A service provider can also provide a way for connecting an enterprise's LAN to the Internet, allowing an enterprise to place their own servers on the Internet.

service rating—The maximum voltage or current that a component is designed to carry continuously.

service request—1. The appeal by a process or task for access to a system resource. 2. A notification to a system that one element wants to access a resource.

service routine—1. In digital computer programming, a routine designed to assist in the actual operation of the computer. 2. A set of instructions to perform a programmed operation, typically in response to an interrupt.

service switch—A switch, usually in a box, for disconnecting the line voltage from the circuits it services.

service unit—In a microwave system, the equipment or facilities used for maintenance communications and transmission of fault indications.

serving—1. Of a cable, wrapping applied around the core before a cable is leaded, or over the lead if the cable is armored. Some common materials are jute, cotton, or duct tape. 2. A wrapping of thread or yarn over a relay coil to protect it from damage.

servo—Short for servomotor. A device that contains and delivers power to move a control or controls.

servoamplifier—A servo unit in which information from a synchro is amplified to control the speed and direction of the servomotor output.

servo control—A technique by which the speed or position of a moving device is forced into conformity with a desired or standard speed or position. For example, the speed of a servo-controlled turntable is established by a precision voltage or frequency standard to which it is compared and automatically adjusted to reduce the difference to a minimum. In a servo-controlled tonearm, a small departure of the cartridge from tangency to the groove is sensed and used to activate a motor drive that moves the tonearm to minimize the error.

servo loop—In a servoamplifier, the entire closed loop formed by feedback from output to input. In a position servo, the output position is compared to a command signal at the input.

servomechanism—1. An automatic feedback-control system in which one or more of its signals represent mechanical motion. 2. A system in which output is compared to input to control error according to desired relationship, or feedback. 3. A self-contained system (except for inputs) in which the feedback signal is subtracted from a desired value so that the difference is reduced to zero. 4. A control system that provides the following: a command instrument to control or program the final process; amplification to strengthen and modify the command signal; work instrumentation to manipulate the controlled process; and feedback provision to initiate corrective action when needed. Since feedback signals go from the controlled process back to the original command station, a servo system is said to operate closed-loop. 5. A device in a closed-cycle system that controls a process based on direct feedback from the process.

servomotor—A motor used in a servo system. Its rotation or speed (or both) are controlled by a corrective electric signal that has been amplified and fed into the motor circuit.

servo noise—The hunting of the tracking servomechanism of a radar as a result of backlash and compliance in the gears, shafts, and structures of the mount.

servo oscillation—An unstable condition in which the load tends to hunt back and forth about the ordered position.

servo system—An automatic control system for maintaining a condition at or near a predetermined value by activation of an element such as a control rod. It compares the required condition (desired value) with the actual condition and adjusts the control element in accordance with the difference (and sometimes the rate of change of the difference).

servo techniques—Methods of studying the performance of servomechanisms or other control systems.

servovalve—Electrohydraulic flow control. An electrical-input, fluid-control valve capable of continuous control.

sesquiband transmission—A system in which the carrier, one full sideband, and half of the other sideband are transmitted.

set—1. To place a storage device in a prescribed state that is opposite to the reset state. 2. To place a binary cell in the 1 state. 3. A permanent change, attributable to any cause, in a given parameter. 4. *See* equipment. 5. Pertaining to a flip-flop input used to affect the Q output. Through this input, signals can be entered to change the Q output from 0 to 1. It cannot be used to change Q to 0. Opposite of clear. 6. An input to a binary counter or register that forces all binaries to assume the maximum binary state. 7. To place a binary device into a given logic state, usually the 1 state.

set analyzer—A test instrument designed to permit convenient measurement of voltages and currents.

set breakpoint—A user debug command that causes the setting of a breakpoint in a specified memory location. At program execution, encountering this breakpoint causes temporary program suspension and a transfer of control to the system debug routine. *See* breakpoint.

set composite—A signaling circuit in which two signaling or telegraph legs may be superimposed on a two-wire interoffice trunk by means of one of the balanced pairs of high-impedance coils connected to each side of the line with an associated capacitor network.

set input—An asynchronous input to a flip-flop used to force the Q output to its high state.

set noise—Inherent random noise caused in a receiver by thermal currents in resistors and by variations in the emission currents of vacuum tubes.

set point—In a feedback control loop, the point that determines the desired value of the quantity being controlled.

set pulse—A drive pulse that tends to set a magnetic cell.

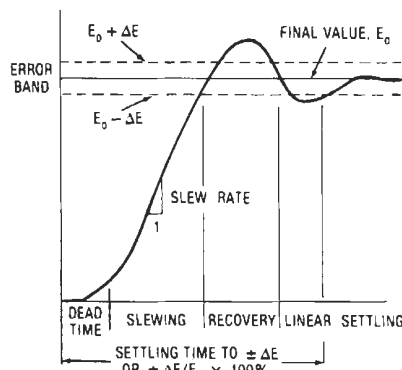
set-reset flip-flop—A standard flip-flop except that if both the set and reset inputs are a 1 at the same time, the flip-flop will assume a prescribed state.

set terminal—The flip-flop input terminal that triggers the circuit from its first state to its second state.

setting accuracy—The ability to set a knob, switch, or other adjustment to the desired time delay, speed, light, sound, or other parameter. Normally specified in percent of maximum or at set point.

settling time—1. The time interval, following the initiation of a specified stimulus to a system, required for a specified variable to enter and remain within a specified narrow band centered on the final value of the variable. 2. In an operational amplifier, the interval between the time of application of an ideal step input and the time at which the closed-loop amplifier output enters and remains within a specified band of error, usually symmetrical

about the final value. Settling time includes a propagation delay and the time needed for the output to slew to the vicinity of the final value, recover from the overload condition associated with slewing, and settle within the specified error range. 3. In a feedback control system, the time required for an error to be reduced to a specified fraction, usually 2 percent or 5 percent, of its original magnitude. 4. The time required for the output frequency of a voltage- or current-tuned oscillator to change from the initial value to within a specified window around the final value in response to a voltage or current stop on the tuning input port. 5. The period required for a digital multimeter's input circuits to reach a steady-state condition before analog-to-digital conversion is started. There are actually three settling times to evaluate. They are the settling time required with an input step change when operating in a fixed range, the settling time required with a range change, and the settling time required with a function change, such as a switch in measurement from ac to dc volts. 6. Time necessary for a multiplexer's output to be within a certain error percentage of the input signal once the channel is selected, or turned on. It may be specified as either the semiconductor switch's switching time plus analog output settling time, or an analog output settling time alone. 7. The time delay between a change of input-signal value and the resultant change in the output signal. Usually expressed in terms of how long it takes the output to arrive at, and remain within, a certain error band around the final value. Often given for several different magnitudes of input-step change. 8. The time required for an amplifier to approach within a percentage of its final steady state value after the application of a step input. It can be specified as 1 percent, 0.1 percent, or 0.01 percent. 9. The elapsed time after a code transition for DAC output to reach a final value within specified limits, usually $\pm 1/2$ lsb. 10. The time elapsing between the start of a measurement and the instant that the indicator reaches, and remains within, a certain percentage of the final measured value (typically ± 1 percent).



Settling time.

set-top unit—Abbreviated STU. Typically refers to the unit/device that sits on top of a television for current cable TV reception. Also refers to digital set-top units, which accept digital media and sometimes support interactivity.

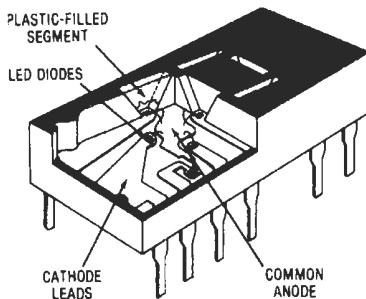
setup—1. The ratio of the difference between black level and blanking level to the difference between reference white level and blanking level, usually expressed in

percent. 2. An arrangement of data or devices for the solution of a particular problem. 3. The difference between the reference black level and the blanking level of a composite video signal.

setup diagram—A diagram that specifies a given computer setup.

setup time—1. The time, measured from the point of 10-percent input change, required for a capacitor-diode gate to open or close after the occurrence of a change of input level. 2. The length of time that data must be present and unchanging before a flip-flop is clocked. 3. Time required before a signal can be changed from its prior state.

seven-segment display—A display format consisting of seven bars so arranged that each digit from 0 to 9 can be displayed by energizing two or more bars. LED, LCD, and gas-discharge displays all use seven-segment display formats.



Seven-segment LED display.

seven-unit teleprinter code—Frequently called Teletype code. A code that represents the letters of the alphabet, the numerals, the punctuation marks, and the various control functions necessary on a teleprinter (such as line feed, carriage return, upshift, and downshift) by five-unit combinations of mark and space conditions. In addition to the five units that indicate the letter or other data, the code contains a start unit, which is always a space, and a stop unit, which is always a mark, to indicate the beginning and ending of each character.

sexadecimal—Pertaining to the number system that has a radix of 16.

sexadecimal notation—Also called dekahexadecimal notation. A scale of notation for numbers with base 16.

sexless connector—Also called hermaphroditic connector. An interconnecting device in which the mating parts are exactly alike at their mating surfaces.

sferics—1. Contraction of the term *atmospherics*, meaning interference. 2. Radio interference from atmospherics, or static.

sferics receiver—Also called lightning recorder. A type of radio direction finder that electronically measures the direction of arrival, intensity, and rate of occurrence of atmospherics. In its simplest form the instrument consists of two orthogonally crossed antennas. Their output signals are connected to an oscillograph so that one loop measures the east-west components. These are combined vertically to give the azimuth.

sg—Abbreviation for screen-grid electrode (of a vacuum tube).

shaded-pole motor—A single-phase induction motor provided with one or more auxiliary short-circuited

stator windings that are displaced magnetically from the main winding.

shading—1. A brightness gradient in the reproduced picture not present in the original scene, but caused by the camera tube. 2. Compensating for the spurious signal generated in a camera tube during the trace intervals. 3. Controlling the directivity pattern of a transducer through the distribution of phase and amplitude of the transducer action over the active face.

shading coil—See shading ring.

shading compensation—Dynamic sensitivity control of the picture signal to reduce the amount of video level change from center to edge of the picture.

shading ring—1. A heavy copper ring sometimes placed around the central pole piece of an electrodynamic loudspeaker to act as a shorted turn for cancellation of the hum voltage of the field coil. 2. A copper ring set into part of the pole piece of a small alternating-current motor to produce the lagging component of a rotating magnetic field for starting purposes.

shading signal—A signal that increases the gain of the amplifier in a television camera while the electron beam is scanning a dark portion.

shadow attenuation—Attenuation of radio waves over a sphere in excess of that over a plane when the distance over the surface and other factors are the same.

shadow factor—The ratio of the electric field strength that would result from propagation over a sphere to that which would result from propagation over a plane (other factors being the same).

shadowgraph—A device arranged in such a manner as to enable photography and/or visual observation of the silhouette of back-illuminated objects placed within the object field of the device and of gradations in luminous intensity resulting from variations in the opacity or in the index of refraction of media contained within the object field.

shadow mask—See aperture mask.

shadow mask tube—A type of color-generating cathode-ray tube that utilizes a shadow mask, a thin perforated electrode located close to the display screen. Each hole in the mask coincides with a triad of three phosphor dots, each representing red, blue, or green. A specific electron beam from the gun energizes phosphor dots of single color.

shadow region—A region in which, under normal propagation conditions, an obstruction reduces the field strength from a transmitter to the point at which radio reception or radar detection is ineffective or virtually so.

shadow tuning indicator—A vacuum tube in which a moving shadow shows how accurately a radio receiver is tuned.

shaft—The axial member to which torque is applied to cause rotation of an adjustable component.

shaft angle encoder—An electromechanical device that has a means for counting equally spaced radii that represent angular increments around the periphery of a disk. Usually, the measurement is in degrees, minutes, and seconds, since 2π radians is not a prime number. Usually the disc is divided into an even number of equal increments.

shaft position encoder—Also called converter or coder. An analog-to-digital converter that transduces a mechanical analog shaft rotation to an electrical digital representation.

shakedown test—An equipment test carried out during the installation work.

shaker—An electromagnetic device capable of imparting known and/or controlled vibratory acceleration to a given object.

shake table—A laboratory tester in which an instrument or component is subjected to vibration that simulates operating conditions.

shake-table test—A laboratory test in which a device or component is placed in a vibrator to determine the reliability of the device or component when subjected to vibration.

shank—1. The part of a phonograph needle that is clamped into position in the pickup or cutting head. 2. The cylindrical or rodlike portion of a connector or contact. 3. That part of a fastener lying between the head and the extreme opposite end. 4. *See* cantilever.

Shannon limit—The maximum signal-to-noise ratio improvement that can be achieved by the best modulation technique, as implied by Shannon's theorem relating channel capacity to signal-to-noise ratio.

Shannon's theorem—*See* sampling theorem.

shaped-beam antenna—An antenna whose directional pattern over a certain angular range is designed to a specific shape for some particular use.

shaped-beam display tube—A cathode-ray tube in which the beam is first deflected through a matrix, then repositioned along the axis of the tube, and finally deflected into the desired position on the faceplate. A typical tube is the Charactron.

shape factor—1. For a filter, the ratio (usually maximum) comparing a high-attenuation-level bandwidth and a low-attenuation-level bandwidth. 2. The ratio of the 60-dB bandwidth to the 6-dB bandwidth. Defines the selectivity of an amplifier stage. 3. A factor used to take the shape of a coil into account when its inductance is computed.

shaping—Adjustment of a plan-position-indicator pattern set up by a rotating magnetic field.

shaping network—1. An electrical network designed to be inserted into a circuit to improve its transmission or impedance properties, or both. *See also* corrective network. 2. A network inserted in a telegraph circuit for improving the waveshape of the signals.

shared data—Data in memory or on a secondary storage device that is used by more than one task.

shared file—A direct-access device that two systems may use at the same time; a shared file may link two systems.

shareware—Software that is freely shared on public networks and BBSs. Users are frequently asked, on the honor system, to remit a small amount of money to the software developer.

sharp-cutoff tube—The opposite of a remote-cutoff tube. A tube in which the control-grid spirals are uniformly and closely spaced. As the grid voltage is made more and more negative, the plate current decreases steadily to cutoff.

sharp tuning—Response to a limited range of frequencies.

shaving—In mechanical recording, the removal of material from the surface of a recording medium for the purpose of obtaining a new surface.

shear wave—1. Also called a rotational wave. A wave, usually in an elastic solid, that causes an element of the solid to change its shape but not its volume. 2. A wave in which particle displacement is at right angles to the direction of propagation.

sheath—1. The external conducting surface of a shield transmission line. 2. A metal wall of a waveguide. 3. Part of a discharge in a rarefied gas, in which there is a space charge due to an accumulation of electrons or ions. 4. The outer covering or jacket of a cable.

sheath-resaping converter—A converter in which the pattern of the wave is changed by gradual

reshaping of the waveguide sheath and the metal sheets mounted longitudinally in the guide.

sheet grating—A three-dimensional grating consisting of thin metal sheets extending along the inside of a waveguide for about one wavelength. It is used to stop all but the predetermined wave, which passes unimpeded.

sheet-metal contact—A contact made by stamping and bending sheet metal rather than by the machining of metal stock. It is available in a wide variety of configurations and is usually less expensive than machined contacts.

sheet resistance—The electrical resistance of a thin sheet of material with uniform thickness as measured across opposite sides of a unit square pattern. Expressed in ohms per square.

sheet resistivity—Also called ohms per square. 1. The electrical resistance measured across the opposite sides of a square pattern of deposited film material. 2. The resistance of a unit area of printed and fired thick-film material. Expressed in ohms per square per unit of film thickness.

Sheffer-stroke function—The Boolean operator that gives a truth-table value of true only when both of the variables that the operator connects are not true.

shelf aging—The change with time of the properties of a stored component or material.

shelf corrosion—Consumption of the negative electrode of a dry cell as a result of local action.

shelf life—1. The length of time under specified conditions that a material or component retains its usability. 2. The time period that an item can be stored, under specified conditions, and still meet specifications. 3. The length of time a battery is expected to retain charge when stored.

shell—1. A group of electrons having a common energy level that forms part of the outer structure of an atom. 2. The outer section of a plug or receptacle that mechanically supports the assembly and in some cases provides coupling and locking. 3. That part of a phonograph pickup which carries the cartridge. The head shell can often be detached from the pickup arm.

shell-type transformer—A transformer in which the magnetic circuit completely surrounds the windings.

shelving equalizer—An equalizer whose boost or cut characteristic response curve resembles a shelf. Maximum boost or cut occurs at the indicated frequency and remains constant at all frequencies beyond.

SHF—Abbreviation for superhigh frequency.

shield—1. A device designed to protect a circuit, transmission line, etc., from stray voltages or currents induced by electric or magnetic fields, consisting, in the case of an electric field, of a grounded conductor surrounding the protected object. At high frequencies this will provide magnetic shielding as well. At low frequencies (through the audio range) magnetic shielding is accomplished by surrounding the object with a material of high magnetic permeability. *See* braid. 2. Any barrier to the passage of interference-causing electrostatic or electromagnetic fields. An electrostatic shield is formed by a conductive layer (usually foil) surrounding a cable core. An electromagnetic shield is a ferrous metal cabinet or wire-way. 3. In cables, a metallic layer placed around a conductor or group of conductors to prevent electrostatic or electromagnetic interference between the enclosed wires and external fields. 4. A metallic covering, usually copper or aluminum, placed around or between electric circuits, around cables or their components, to suppress the effects of undesired signals that may originate from adjacent or external sources. The shield may be braided wires, foil wrap, foil backed tape, a metallic tube, or conductive vinyl or rubber.

shield coverage—*See* shield percentage.

shielded building — In modern practice, a building in which shielding was incorporated in the basic architectural design. Shielded buildings often employ structural steel members as an integral part of RFI shielding.

shielded cable — 1. A single- or multiple-conductor cable surrounded by a separate conductor (the shield) intended to minimize the effects of adjacent electrical circuits. 2. A cable in which each insulated conductor is enclosed in a conducting envelope so constructed that substantially every point of the surface of the insulation is at ground potential with respect to ground under normal operating conditions.

shielded-conductor cable — A cable in which the insulated conductor or conductors are enclosed in a conducting envelope or envelopes, almost every point on the surface of which is at ground potential with respect to ground.

shielded enclosure — A room, hangar, or box that is shielded or screened so as to provide a controlled electromagnetic environment.

shielded joint — A cable joint having its insulation so enveloped by a conducting shield that substantially every point on the surface of the insulation is at ground potential, or at some predetermined potential with respect to the ground.

shielded line — A transmission line whose elements confine propagated radio waves to an essentially finite space inside a tubular conducting surface called the sheath, thus preventing the line from radiating radio waves.

shielded pair — A two-wire transmission line surrounded by a metallic sheath to isolate the pair from electrical interference.

shielded room — An enclosed area made free from electrical interference that would affect the sensitivity of electrical equipment.

shielded transmission line — A transmission line whose elements confine the propagated electrical energy inside a conducting sheath.

shielded wire — An insulated wire covered with a metal shield — usually of tinned, braided copper wire.

shielded X-ray tube — An X-ray tube enclosed in a grounded metal container, except for a small opening through which the X-rays emerge.

shield effectiveness — The relative ability of a shield to screen out undesirable radiation.

shield factor — Ratio between the noise (or induced current or voltage) in a telephone circuit when a source of shielding is present and when it is not.

shield grid — In a glass tube, a structure that shields the control electrode from the anode or cathode, or both. It prevents the radiation of heat from them and the depositing of thermionic activating material on them. It also reduces the electrostatic influence of the anode, and may be used as a control electrode in some applications.

shield-grid thyatron — A thyatron that contains a shield grid, usually operated at the same potential as the cathode.

shielding — 1. The practice of confining the dielectric field of an electric cable to the inside of the cable insulation or insulated conductor assembly by surrounding the insulation or assembly with a grounded conducting medium called a shield. 2. Metal covering used on a cable; also a metal can, case partition, or plates enclosing an electronic circuit or component. Shielding is used to prevent undesirable radiation, pickup of signals, magnetic induction, stray current, ac hum, or radiation of an electrical signal. 3. A physical barrier, usually electrically conductive, designed to reduce the interaction of electric or magnetic fields on devices, circuits, or portions of circuits.

shielding effectiveness — The relative reduction of radiated electromagnetic energy levels occasioned by the use of an enclosure either to contain or exclude the energy.

shield percentage — Also called shield coverage. The physical area of a circuit or cable actually covered by shielding material, expressed in percent.

shield wire — A wire employed for reducing the effects of extraneous electromagnetic fields on electric supply or communication circuits.

shift — 1. Displacement of an ordered set of computer characters one or more places to the left or right. If the characters are the digits of a numerical expression, a shift is equivalent to multiplying a power of the base. 2. The process of moving information from one place to another in a computer; generally, a number of bits are moved at once. A word can be shifted sequentially (generally referred to as shifting left or right), or all bits of a word can be shifted at the same time (called parallel load or parallel shift). 3. In a computer, an operation whereby a number is moved one or more places to the left or right. The number 110, for instance, becomes 1100 if shifted one place left or 11 if shifted one place right. The operation is of considerable use in digital computer operations. 4. The difference between the mark and space frequencies. For example, if the mark frequency is 2125 Hz and the space frequency is 2295 Hz, the difference of 170 Hz is referred to as the shift. The 170-Hz and 850-Hz shifts have become two widely used standards.

shift counter — 1. A shift register in which the first stage, through logic feedback, produces a pattern of 1s or 0s as a function of the state of other stages in the register. The pattern of 1s and 0s so produced is termed a ring code. 2. See ring counter, 2.

shift-frequency modulation — A form of frequency modulation in which the modulating wave shifts the output frequency between predetermined values and the output wave is coherent, with no phase discontinuity.

shift-in character — In a computer, a code extension character that can be used by itself to bring about a return to the character set in effect before substitution of another set was caused by a shift-out character.

shift out — In a computer, to move information within a register toward one end so that, as the information leaves this one end, 0s are entered into the other end.

shift-out character — In a computer, a code extension character that can be used by itself to cause substitution of some other character set for the standard set, usually to access additional graphic characters.

shift pulse — A drive pulse that initiates the shifting of characters in a register.

shift register — 1. A digital storage circuit in which information is shifted from one flip-flop of a chain to the adjacent flip-flop on application of each clock pulse. Data may be shifted several places to the right or left, depending on additional gating and the number of clock pulses applied to the register. Depending on the number of positions shifted, the rightmost characters are lost in a right shift, and the leftmost characters are lost in a left shift. See dynamic shift register; static shift register. 2. A program, entered by the user into the memory of a programmable controller, in which the information data (usually single bits) is shifted one or more positions on a continual basis. There are two types of shift registers: asynchronous and synchronous. 3. A register in which binary data bits are moved as a contiguous group a prescribed number of positions to the right or to the left. 4. A memory in which data words are entered serially and shifted to successive storage locations. The data word can be read when it has been sequentially shifted to the output. 5. A digital circuit consisting of flip-flops, which is used

to convert parallel data (where several binary digits arrive at once) to serial (where the same digits travel one after another), or vice versa.

ship error—A radio direction-finder error that occurs when radio waves are reradiated by the metal structure of a ship.

ship-heading marker—On a PPI scope, an electronic radial sweep line indicating the heading of the ship on which the equipment is installed.

ship's emergency transmitter—A ship's transmitter to be used exclusively on a distress frequency for distress, urgency, or safety purposes.

ship station—A radio station operated in the maritime mobile service and located on board a vessel that is not permanently moored.

ship-to-shore communication—Communication by radio between a ship at sea and a shore station.

shock—1. An abrupt impact applied to a stationary object. It is usually expressed in gravities (g). 2. An acceleration transient of short duration and nonrepetitive occurrence. 3. Sudden stimulation of the nerves and convulsive contraction of the muscles caused by a discharge of electricity though the body.

shock absorber—A device for dissipating vibratory energy, to modify the response of a mechanical system to an applied shock.

shock excitation—See impulse excitation.

shock-excited oscillations—See free oscillations.

shock hazard—A hazardous condition that exists at a part of a ground-fault circuit interrupter if (a) there would be current of 5 milliamperes or more in a resistance of 500 ohms connected between the part in question and the grounded supply conductor, and (b) the device would not operate to open the circuit to the 500-ohm resistor within a specified time.

shock isolator—Also called a shock mount. A resilient support that tends to isolate a system from applied mechanical shock.

Shockley diode—A four-layer controlled semiconductor rectifier diode without a base connection, used as a trigger or switching diode.

shock motion—In a mechanical system, transient motion characterized by suddenness and by significant relative displacements.

shock mount—See shock isolator.

shockover capacitor—A capacitor connected between the grid and cathode of a thyratron to prevent premature firing.

shock pulse—Usually a single disturbance that is characterized by an increase and a decrease of acceleration in a relatively short period.

shock test (mechanical)—A test to determine the ability of a device to withstand suddenly applied forces of specified magnitude and duration.

shodop—Acronym for short-range Doppler.

shoran—Acronym for short-range air navigation. A precision distance-measuring system employing the pulse timing principle to measure the distance from an aircraft to one or more fixed responder ground stations. Fundamentally, the system consists of a mobile transmitter-receiver-indicator unit and a fixed receiver-transmitter unit (transponder). Pulses are sent from the mobile transmitter and returned to the originating point by the transmitter. The indicator measures the time interval required for the travel of a pulse between stations and converts this information into distance to the nearest thousandth of a mile.

shore effect—The bending of radio waves toward the shore line when traveling over water, due presumably

to the slightly greater velocity of radio waves over water than over land. This effect causes errors in radio direction-finder indications.

shore-to-ship communication—Communication by radio between a shore station and a ship at sea.

short—See short circuit.

short base-line system—A system that uses continuous waves and that has a base-line length that is short in comparison to the target distance.

short check—See flash test.

short circuit—Also called a short. 1. An abnormal connection of relatively low resistance between two points of a circuit. The result is excess (often damaging) current between these points. 2. An accidental or intentional near-zero resistance connection between two sides of a circuit. 3. An abnormal connection of relatively low impedance, whether made accidentally or intentionally, between two points of different potential. 4. A low-resistance path in a system that allows the current to flow outside of the proper circuit in an appliance, junction box, or in the wires. Due to a failure in insulation or improper hookup, the current takes the short low-resistance path rather than flowing through the entire circuit. 5. An abnormal condition that occurs when there is an unwanted electrical connection between two wires. It results in a flow of excess current.

short-circuit current—1. The current a power supply delivers when its output terminals are short-circuited. 2. An electronic regulator's output current with the output terminal shorted to the negative supply. Short-circuited current and maximum regulator output current depend on the pass circuitry. The maximum output current is also limited by the maximum allowable package power dissipation and, hence, by quiescent current.

short-circuit driving-point admittance—The driving-point admittance between the j terminal of an n -terminal network and the reference terminal when all other terminals have zero alternating components of voltage with respect to the reference point.

short-circuit feedback admittance (of an electron-device transducer)—The short-circuit transfer admittance from the output terminals to the input terminals of a specified socket, the associated filters, and the electron device.

short-circuit forward admittance (of an electron-device transducer)—The short-circuit transfer admittance from the input terminals to the output terminals of a specified socket, the associated filters, and the electron device.

short-circuit impedance—1. The driving-point impedance of a line or four-terminal network when its far end is short-circuited. 2. The input impedance to a line or four-terminal network when the far end or output terminals are shorted.

short-circuiting or grounding device—A power or stored-energy operated device that functions to short-circuit or ground a circuit in response to automatic or manual means.

short-circuit output admittance (of an electron-device transducer)—The short-circuit driving-point admittance at the output terminals of a specified socket, the associated filters, and the electron device.

short-circuit output capacitance (of an n -terminal electron device)—The effective capacitance determined from the short-circuit output admittance.

short-circuit parameters—In an equivalent circuit of a transistor, the resultant parameters when independent variables are selected for the input and output voltages.

short-circuit protection (automatic)—A current-limiting system that enables a power supply to continue

operating without damage into any output overload, including short circuits. The output voltage must be restored to normal when the overload is removed, as distinguished from a fuse or circuit-breaker system, which opens at overload and must be reclosed to restore power.

short-circuit transfer admittance—The transfer admittance from terminal j to terminal l of an n -terminal network when all terminals except j have zero complex alternating components of voltage with respect to the reference point.

short-circuit transfer capacitance (of an electron device)—The effective capacitance determined from the short-circuit transfer admittance.

short code—A system of instructions that causes an automaton to behave as if it were another, specified automaton.

short-contact switch—A selector switch in which the movable contact is wider than the distance between its clips, so that the new circuit is made before the old one is broken.

short-distance navigational aid—An equipment or system that provides navigational assistance to a range not exceeding 200 miles (322 km).

shorted—Prevented from operating by a short circuit.

shorted out—Made inactive by connecting a heavy wire or other low-resistance path around a device or portion of a circuit.

short-flash light source—An electronic flash tube in which the flash recurs at a frequency extending to many thousands per second. A stroboscopic light source is a short-flash light source.

short-gate gain—Video gain on a short-range gate.

shorting noise—A noise that occurs in wirewound potentiometric transducers, even when no current is drawn from the device. It is due to the shorting out of adjacent turns of the wire as the slider traverses the winding. The portion of the interturn current that flows through the slider appears as noise.

shorting switch—A switch type in which contact is made for a new position before breaking contact with the previous position. Classified as a make-before-break switch.

short-range navigation—A precision position-fixing system using a pulse transmitter and receiver in connection with two transponder beacons at fixed points.

short-range navigation aid—A navigation aid that is usable only at distances within radio line of sight.

short-slot coupler—A 3-dB coupler.

short-time duty—A service requirement that demands operation at a substantially constant load for a short, specified time.

short time limits—Values of minimum and maximum trip time measured at various percentages of overload.

short-time rating—The rating that defines the load that a machine, apparatus, or device can carry at approximately the room temperature for a short, specified time.

shortwave—Abbreviated sw. Radio frequencies from 1.6 to 30 MHz, which fall above the commercial broadcasting band and are used for sky-wave communication over long distances.

shortwave converter—An electronic unit designed to be connected between a receiver and its antenna system to permit reception of frequencies higher than those the receiver ordinarily handles.

shortwave transmitter—A radio transmitter that radiates shortwaves, which ordinarily are shorter than 200 meters.

shot effect—Noise voltages developed by the random travel of electrons within a tube. The effect is characterized by a steady hiss from a radio, and by snow or grass in a television picture.

shotgun mike—Also called a hyperdirectional or long-reach mike. An extremely unidirectional microphone, used for spotting a speaker or soloist from a considerable distance.

shot noise—1. Noise generated due to the random passage of discrete current carriers across a barrier or discontinuity, e.g., a semiconductor junction, as well as by thermal agitation in a base resistor. Shot noise is characteristic of all transistors and diodes and is directly proportional to the square root of the applied current. 2. Noise voltages developed in a thermionic tube as a result of random variations in the number and velocity of electrons emitted by the cathode. The effect is characterized by the presence of a steady hiss in audio reproduction and of snow or grass in video reproduction. The shot noise (German, *schotteffekt*) concept stems from the random manner in which electrons in a vacuum tube collide with the plate (anode)—not unlike the sound effect produced by casting a handful of BB-shot against a wall, with their slightly differing and overlapping impact times. Additionally, the electrons from a vacuum-tube cathode are not emitted uniformly, producing fluctuation noise. 3. Noise that is inherent in an electric current because it consists of a stream of finite particles, i.e., electrons. 4. The noise generated by a charge crossing a potential barrier. For medium and high frequencies it is the dominant noise mechanism in bipolar devices. Shot noise has a constant spectral density.

shrinkable tubing—1. A nonmetallic tubing that is fabricated to allow a nonreversible decrease in its diameter on the application of heat. It is used to provide insulation or mechanical protection to conductors, cables, splices, and terminations. 2. Plastic or elastomeric tubing used to protect wires, cables, and splices from mechanical damage. The tubing shrinks to a predetermined size on application of heat or solvent evaporation.

shunt—1. A precision low-value resistor placed across the terminals of an ammeter to increase its range. The shunt may be either internal or external to the instrument. 2. Any part connected, or the act of connecting any part, in parallel with some other part. 3. In an electric circuit, a branch whose winding is in parallel with the external or line circuit. 4. An alternate path in parallel with a part of a circuit. 5. To place a circuit element in parallel with another. 6. To bypass a portion of a circuit. 7. A deliberate shorting-out of a portion of an electric circuit. 8. A key-operated switch that removes some portion of an alarm system from operation, allowing entry into a protected area without initiating an alarm signal. A type of authorized access switch. 9. A calibrated low resistance connected in parallel with the input terminals of an ammeter, to enable measurement of a wider range of currents.

shunt calibration—A procedure in which a parallel resistance is placed across a (similar) element to obtain a known and deliberate electrical change.

shunt-fed vertical antenna—A vertical antenna connected to the ground at the base and energized at a suitable point above the grounding point.

shunt feed—See parallel feed.

shunt field—Part of the magnetic flux produced in a machine by the shunt winding connected across the voltage source.

shunt-field relay—A special polarized relay with two coils on opposite sides of a closed magnetic circuit. The relay operates only when the currents in its two windings flow in the same direction.

shunting effect—A reduction in signal amplitude caused by the load that an amplifier or measuring instrument imposes on the signal source. For dc signals the shunting effect is directly proportional to the output impedance of the signal source and inversely proportional to the input impedance of the amplifier.

shunting or discharge switch—A switch that serves to open or to close a shunting circuit around any piece of apparatus (except a resistor), such as a machine field, a machine armature, a capacitor, or a reactor.

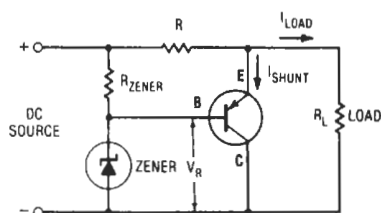
shunt leads—Those leads that connect the circuit of an instrument to an external shunt. The resistance of these leads must be taken into account when the instrument is adjusted.

shunt loading—Loading in which reactances are applied in parallel across the conductors of a transmission circuit.

shunt neutralization—See inductive neutralization.

shunt peaking network—See peaking network.

shunt regulator—A device placed across the output of a regulated power supply to control the current through a series-dropping resistance in order to maintain a constant output voltage or current.



Shunt regulator.

shunt T-junction—See H-plane T-junction.

shunt wire—A conductor joining two parts of an electric circuit to divert part of the current.

shunt-wound generator—A direct-current generator in which the field coils and armature are connected in parallel.

shunt-wound motor—1. A direct-current motor that has its field (stationary member) and armature (rotating member) circuit connected in parallel. Its speed can be regulated by varying either the applied armature or field voltage. 2. A motor whose armature and field windings are connected in parallel. It has a fairly constant speed, but a low starting torque.

shutoff—A provision whereby a recorder will automatically go into the stop mode at the end of a tape. In some recorders, the automatic shutoff can be made to turn off the entire unit as well as any other components powered by it.

shutter—A movable cover that prevents light from reaching the film or other light-sensitive surface in a still, movie, or television camera except during the exposure time.

shuttle—A high-speed tape-running mode that permits fast cuing or rewinding of the tape.

si-balance—The strong emphasis in pronunciation of the letters "s" and "sh" in speech. It can be exaggerated by microphones having peaks in their high-frequency response.

SIC—Abbreviation for semiconductor integrated circuit.

side armature—An armature that rotates about an axis parallel to that of the core, with the pole face on a side surface of the core of a relay.

sideband attenuation—Attenuation in which the relative transmitted amplitude of one or more components of a modulated signal (excluding the carrier) is smaller than the amplitude produced by modulation.

sideband power—The power contained in the sidebands. This is the power to which a receiver responds when receiving a modulated wave, not the carrier power.

sidebands—1. The frequency bands on both sides of the carrier frequency. The frequencies of the wave produced by modulation fall within these bands. 2. The wave components lying within such bands. During amplitude modulation with a sine-wave carrier, the upper sideband includes the sum (carrier plus modulating) frequencies, and the lower sideband includes the difference (carrier minus modulating) frequencies. 3. The modulation bands of frequencies that are both above and below the carrier frequency during modulation. 4. A band of frequencies on each side of the carrier frequency of an amplitude-modulated wave. Each sideband contains all of the information that was in the modulating wave. (The upper sideband contains frequencies that are the sums of the carrier and modulation frequencies, and the lower sideband contains the difference frequencies.)

sideband splatter—1. Those portions of the modulation sidebands that lie beyond the limits of the assigned channel. 2. In radio communications, interference on other channels caused by spurious sidebands resulting from overmodulation.

side circuit—A circuit arrangement for deriving a phantom circuit. In four-wire circuits, the two wires associated with the "go" channel form one side circuit, and those associated with the return channel form another. See also phantom circuit.

side-circuit loading coil—A loading coil for introducing a desired amount of inductance into a side circuit while introducing a minimum amount of inductance into the associated phantom circuit.

side-circuit repeat coil—See side-circuit repeating coil.

side-circuit repeating coil—Also called side-circuit repeat coil. A device that functions as a transformer at a terminal of a side circuit, and acts simultaneously as a device for superposing one side of a phantom circuit on the side circuit.

side echo—An echo due to a side lobe of an antenna.

side frequency—One of the frequencies of a sideband.

side lobe—A portion of the beam from an antenna, other than the main lobe. It is usually much smaller than the main lobe. See figure on page 691.

side-lobe blanking—A technique that compares relative signal strengths between an omnidirectional antenna and the radar antenna.

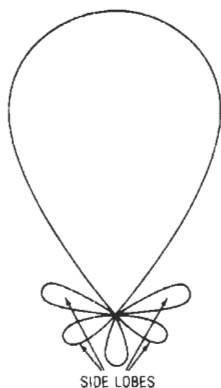
side-lobe cancellation—A technique designed to exclude or greatly attenuate jamming signals introduced through the side or back lobes of a receiving antenna.

side-looking airborne radar—A high-resolution airborne radar system in which the beam from the antenna is directed at right angles to the direction of flight.

siderial day—The time it takes for the earth to rotate exactly 360° about its axis with respect to the "fixed" stars. The siderial day contains 1436.07 minutes. Compare solar day.

sideswiper—A telegraph key that operates from side to side rather than up and down.

side thrust—1. In disc recording, the radial component of force on a pickup arm caused by the stylus drag. 2. The tendency of a stylus to skate toward the center of a



Side lobes.

record, causing increased wear on the inner groove wall. With low tracking weight, side thrust can cause the stylus to jump the record's groove.

sidetone—1. The reproduction, in a telephone receiver, of sounds received by the transmitter of the same telephone set (e.g., hearing one's own voice in the receiver of a telephone set when speaking into the mouthpiece). 2. That portion of a speaker's voice that is fed back to his or her receiver.

sidetone telephone set—A telephone set with no balancing network for reducing sidetone.

siemens—1. International standard unit of conductance that replaces and is identical with the term *mho*. The reciprocal of resistance in ohms. 2. The unit of electric conductance of a conductor in which a current of 1 ampere is produced by an electric potential difference of 1 volt.

sight check—To verify the sorting or punching of punched cards by looking through the pattern of punched holes.

sign—1. A symbol that distinguishes negative from positive quantities. 2. A binary indicator of the position of the magnitude of a number relative to zero.

signal—1. A visible, audible, or other conveyor of information. 2. The intelligence, message, or effect to be conveyed over a communication system. 3. The physical embodiment of a message or of information. 4. An electrical wave used to convey information. 5. An alerting signal; that is, an acoustic device (such as a bell) or a visual device (such as a lamp) that calls the attention. 6. To transmit an information signal or alerting signal. 7. The event, phenomenon, or electrical quantity that conveys information from one point to another. 8. A current used to convey information, either digital, analog, audio, or video. 9. An electrical impulse of a predetermined voltage, current, polarity, and pulse width. 10. Any electronic visual, audible, or other indication used to convey information. In semiconductors, an electrical quantity (typically voltage, current, or light level) corresponding to some physical quantity. Signals are coded in frequency or amplitude to separate them from unwanted noise.

signal attenuation—The reduction in the strength of electrical signals.

signal averaging—A technique for extracting a signal waveform (generally a time-varying voltage) from a background of unwanted noise. Simple frequency-domain filtering with passive or active circuit elements is the most widely used method for accomplishing this result. But this type of filtering is effective only when the frequency spectrum of the signal and the frequency

spectrum of the noise do not overlap. A signal averager is a special kind of filter, sometimes referred to as a comb filter. It can be used effectively only if the desired signal, with its contaminating noise, can be repeated a number of times. In addition, a synchronization of that pulse must have a fixed time relationship to the desired signal, preferably, but not necessarily, ahead of the signal.

signal-averaging computer—An electronic averager that filters out signals of interest from background noise.

signal bias—A form of teletypewriter signal distortion brought about by the lengthening or shortening of pulses during transmission. When marking pulses are all lengthened, a marking signal bias results; when marking pulses are all shortened, a spacing signal bias results.

signal-carrier FM recording—A method of recording in which the input signal is frequency modulated onto a carrier, and the carrier is recorded on a single track at saturation and without bias.

signal conditioner—A device placed between a signal source and a readout device for the purpose of conditioning the signal. Some examples are damping networks, attenuator networks, preamplifiers, excitation and demodulation circuits, converters for changing one electrical quantity into another (such as voltage to current), instrument transformers, equalizing or matching networks, and filters.

signal conditioning—1. To process the form or mode of a signal so as to make it intelligible to, or compatible with, a given device, including such manipulation as pulse shaping, pulse clipping, digitizing, and linearizing. 2. Any operation that prepares a transducer signal for subsequent display or control functions. Depending on the application, a transducer signal might require any one or a combination of several conditioning operations such as filtering, amplification, isolation, integration, differentiation, and rectification. For extracting low-level signals from electrical noise, an instrumentation amplifier is often the best choice.

signal conductor—An individual conductor used to transmit an impressed signal.

signal converter—A circuit that reduces, filters, and (if necessary) rectifies incoming signals to logic system levels.

signal delay—The transmission time of a signal through a network. The time is always finite, and it may be undesired or purposely introduced.

signal diode—1. A semiconductor diode used for the purpose of extracting or processing information contained in an electrical signal that varies with time and may be either analog or digital in nature. 2. A diode that exhibits an asymmetrical voltage-current characteristic and is used for signal detection.

signal-distortion generator—An instrument furnished and designed to apply distortion on a signal for the purpose of ranging and adjusting teletypewriter equipment or for furnishing a clear signal.

signal dropout—The loss of signal that occurs when the signal becomes too weak to be usable.

signal electrode—The electrode from which the signal output of a camera tube is taken.

signal element—Also called a unit interval. That part of a signal which occupies the shortest interval of the signaling code. It is considered to be of unit duration in building up signal combinations.

signal encoding device—A system component located at the protected premises that will initiate the transmission of an alarm signal, supervisory signal, trouble signal, or other signals the central station is prepared to receive and interpret.

signal enhancement—Ensemble averaging of time-domain signals, whereby a set of time domain samples are digitized and then averaged. In order to enhance the signal due to averaging, the time function must be repetitive, and the start of the ensemble average must have a known relationship to some repetitive event (trigger). Such a repetitive signal is the vibration from one rotation of an engine (where the firing of spark plug 1 serves as the trigger).

signal filtering—The shaping of amplitude or phase characteristics with respect to frequency, for the purpose of meeting an operational requirement. This usually is accomplished by analog methods.

signal-frequency shift—In a frequency-shift facsimile system, the numerical difference between the frequencies corresponding to the white and black signals at any point in the system.

signal generator—1. Also called a standard voltage generator. A device that supplies a standard voltage of known amplitude, frequency, and waveform for measuring purposes. 2. An instrument that provides

(a) Calibrated and variable frequency over a broad range.

(b) Calibrated and variable output level over a wide dynamic range.

(c) One or more forms of calibrated modulation. Not all frequency sources or synthesizers are signal generators. Sweepers, test oscillators, and traditional frequency synthesizers cannot be classified as signal generators because they usually lack a calibrated output or some form of calibrated modulation. 3. A portable test oscillator that can be adjusted to provide a test signal at some desired frequency, voltage, modulation, or waveform.

signal ground—The ground return for low-level signals, such as inputs to audio amplifiers or other circuits, that are susceptible to coupling through ground-loop currents.

signal highlighting—Identifying the connection points of a net in a printed circuit board.

signaling—1. The process by which a caller on the transmitting end of a line informs a particular party at the receiving end that a message is to be communicated. Signaling is also that supervisory information that lets the caller know that the called party is ready to talk, that his or her line is busy, or that he or she has hung up. Signaling also holds the voice path together while a conversation goes on. 2. Indicating to the receiving end of a communication circuit that intelligence is to be transmitted. 3. In a circuit-switched telecommunications network, the exchange of information that is concerned with the establishment, control, and management of a telephone connection.

signaling channel—A tone channel used for signaling purposes.

signaling key—A key used in wire or radiotelegraphy to control the sequence of current impulses that form the code signals.

signal injector—A test instrument, usually small, that contains an audio-frequency pulse oscillator. A signal injected at points in the circuitry aids in troubleshooting.

signal intelligence—A generic term that includes both communications intelligence and electronics intelligence.

signal interpolation—See interpolation.

signal lamp—A lamp that indicates, when lit or out, the existence of certain conditions in a circuit (e.g., signal lamps on switchboards, or pilot lamps in radio sets).

signal leakage—Interference in a given playback channel that has its origin in the recording system. Such interference occurs during simultaneous record/reproduce

and has a leading time displacement with reference to the signal on the tape.

signal level—1. The difference between the measure of the signal at any point in a transmission system and the measure of an arbitrary reference signal. (Audio signals are often stated in decibels—thus, their difference can be conveniently expressed as a ratio.) 2. The magnitude of signal compared with an arbitrary reference magnitude.

signal line—One of a set of signal conductors in an interface system used to transfer messages among interconnected devices.

signal matching—Inserting buffers near the target system when the target microprocessor is replaced for emulation, so that the signals at the target microprocessor are reproduced exactly.

signal-muting switch—A switch used on a record changer to ground (mute) the signal from the pickup during a change cycle.

signal-noise ratio—See signal-to-noise ratio.

signal parameter—That parameter of an electrical quantity whose values or sequence of values conveys information.

signal plane—A conductor layer intended to carry a signal, rather than serve as a ground or other fixed-voltage function.

signal plate—A metal plate that backs up the mica sheet containing the mosaic in one type of cathode-ray television camera tube. The electron beam acts on the capacitance between this plate and each globule of the mosaic to produce the television signal.

signal plus noise and distortion—A radio-receiver sensitivity measurement based on the signal input required to produce 50 percent of the rated output at a 12-decibel ratio (4:1 voltage ratio) of signal plus noise and distortion to noise and distortion alone.

signal-point stereo microphone—A housing containing two, usually directional, microphones angled so that each picks up sound from one side of the stereo field, with both picking up sounds from the middle.

signal processing—A broad class of electronic functions that enhance the representations of physical or electrical phenomena. Temperature, pressure, vibration, acceleration, and flow are examples of physical properties that rely on signal processing enhancements. The detection and conversion of rf, X-ray, or ultrasonic energy into images and sound is another form of signal processing.

signal processing equipment—Any equipment or circuit used to intentionally change the characteristics (but not the overall level) of a signal. Includes such devices as equalizers, limiters, phasers, flangers, and delay lines.

signal reconditioning—The act of partially or completely restoring the original form of a distorted signal.

signal regeneration—The process of demodulating a received signal to recover its baseband data (thus removing received noise but creating bit errors) and remodulating the baseband signal onto a carrier for retransmission.

signal report—A report given in numerical values of signal strength and quality.

signal-separation filter—A bandpass filter that selects the desired signal or channel from a composite signal.

signal-shaping network—An electric network inserted into a telegraph circuit, usually at the receiving end, to improve the waveshape of the signals.

signal-shield ground—A ground technique for all shields used for the protection from stray pickup of leads carrying low-level, low-frequency signals.

signal shifter—A variable-frequency oscillator for shifting amateur transmitters to a less crowded frequency within a given band.

signal splitter—A passive device that enables two or more TV sets to divide a TV signal between them with proper balancing and isolation. Available in either 75- or 300-ohm impedances.

signal strength—1. The strength of the signal produced by a transmitter at a particular location. Usually it is expressed as so many millivolts per meter of the effective receiving-antenna length. 2. The intensity of the television signal measured in volts, millivolts, microvolts, or decibels, using 0 dB as a reference. Equal to 1000 microvolts in rf systems; generally 1 volt in video systems.

signal-strength meter—Also called an S meter. A meter connected in the AVC circuit of a receiver and calibrated in dB or arbitrary "S" units to read the strength of a received signal.

signal-to-distortion ratio—The ratio of desired to undesired signal in a transmitted single-sideband signal.

signal-to-noise ratio—Abbreviated SNR or s/n ratio. Also called signal-noise ratio. 1. Ratio of the magnitude of the signal to that of the noise (often expressed in decibels). 2. In television transmission, the ratio in decibels of the maximum peak-to-peak voltage of the video television signal (including the synchronizing pulse) to the rms voltage of the noise at any point. 3. The ratio of the amplitude of a signal after detection to the amplitude of the noise accompanying the signal. It may also be considered as the ratio, at any specific point of a circuit, of signal power to total circuit-noise power. 4. Ratio of the root-mean-square facsimile signal level to the root-mean-square noise level. 5. The difference, measured in decibels, between a specified signal reference level and the level of unwanted noise. The higher the ratio, the better the equipment. 6. The span, measured in decibels, of signal intensity between a device's overload point at the upper limit and its background noise at the lower limit. (In tape recording, the s/n ratio usually lies between the permissible limit of saturation distortion and the tape's background hiss.) 7. The ratio, in decibels, between a reference power output (usually an amplifier's rated power) and the hum and noise power in the output of the amplifier. The higher this ratio, the better. 8. The ratio, usually in decibels, between the level of the loudest undistorted tone that can be recorded and the noise that is generated and recorded when no signal is present. 9. The ratio of the power in a desired signal to the undesirable noise present in the absence of a signal. 10. The difference between the nominal or maximum operating level and the noise floor; usually specified in decibels. 11. The ratio of the peak value of the video signal to value of the noise. Usually expressed in decibels.

signal tracer—A test instrument used for tracing a signal through a circuit in order to find faulty wiring or components.

signal tracing—The process of locating a fault in a circuit by injecting a test signal at the input and checking each stage, usually from the output backwards.

signal voltage—The effective (root-mean-square) voltage value of a signal.

signal wave—A wave with characteristics that permit it to carry intelligence.

signal-wave envelope—The contour of a signal wave that is composed of a series of wave cycles.

signal winding—Also called an input winding. In a saturable reactor, the control winding to which the independent variable (signal wave) is applied.

signature (target)—The characteristic pattern of the target displayed by detection and classification equipment.

signal shifter — significant digits (of a number)

signature analysis—Abbreviated SA. 1. A synchronous process, whereby activity at an electrical node (referenced to a clock signal) is monitored for a particular stimulus over a given time. The analysis that follows the nodal monitoring is based on data compression. The long, complex pattern of a data stream is reduced to a 16-bit, 4-digit "signature." Correct signatures for a particular circuit are determined empirically from tests on a known-good product. 2. A means of isolating digital logic faults at the component level applicable to all digital systems. The technique involves the tracing of signals and the conversion of lengthy bit streams into 4-digit hexadecimal "signatures." Using logic diagrams and schematics specially annotated with correct signatures at each trace node, and guided by troubleshooting trees, a circuit can be traced back to a point in the circuit that has a correct input signature and incorrect output signature. Signatures are traced under the direction of a test PROM. 3. A patented troubleshooting technique (Hewlett-Packard Co.) based on the principle that a good digital circuit in a known (initialized) state will produce the same output when stimulated repeatedly by the same input. If the repeated output of a device is not the one it has been designed to produce, it has failed. 4. A specific digital-circuit-testing troubleshooting technique that makes use of coded representations of serial bit streams. Using a known input signal, a signature-analysis system generates such a coded representation at each point on a known-good pc board. The signature at each point on a board under test should then be the same as the signature at the corresponding point on the known-good board. 5. A technique for compressing large amounts of digital data into a relatively short data word, or signature. If the signature matches a reference signature it can be assumed, to an extremely high probability, that the data stream is valid. Signature analysis, therefore, can be used to verify the integrity of data streams.

signature analyzer—An instrument that compares stored patterns (signatures) against actual received patterns.

signature testing—Comparison of the actual output digital signatures, such as transition counts, with the expected correct signatures recorded from a known-good device.

sign bit—1. In complementary arithmetic, the leftmost bit of a number. If the sign bit is 1, the number is negative; if it is 0, the number is positive. 2. The leftmost bit of a computer word, which is sometimes used to indicate whether the number it contains is positive or negative. A 0 usually means a positive number, and a 1 a negative number.

sign-control flip-flop—In computers, a flip-flop in the arithmetic unit used for storing the sign of the result of an operation.

sign digit—A character (+ or -) used to designate the algebraic sign of a number.

significance—Weight. In positional representation, the factor by which a digit must be multiplied to obtain its additive contribution to the value of a number; the factor is determined by the digit position.

significant digits (of a number)—1. A set of digits from consecutive columns, beginning with the most significant digit other than zero, and ending with the least significant digit whose value is known or assumed to be relevant. The digits of a number can be ordered according to their significance, which is greater when occupying a column corresponding to a higher power of the radix. 2. A digit that contributes to the precision of a number. Significant digits are counted from the first digit on the left that is not zero and continue to the last accurate digit on the right. (A right-hand zero may be counted if it is

an accurate part of the numeral.) For example, 2500.0 has five significant digits, 2500 probably has only two (it is not known that the last two digits are accurate) but 2501 has four, and 0.0025 has two.

sign position—A position, normally at one end of a number, that contains an indicator of the algebraic sign of the number.

silent alarm—A remote alarm without an obvious local indication that an alarm has been transmitted.

silent-alarm system—An alarm system that signals a remote station by means of a silent alarm.

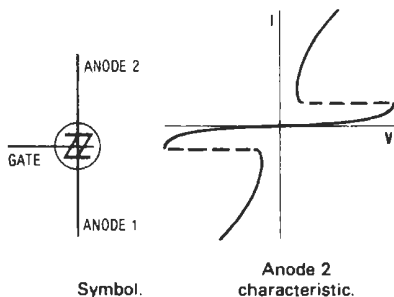
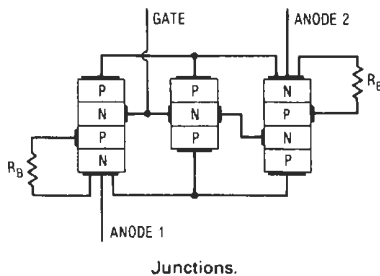
silent discharge—The gradual and nondisruptive discharge of electricity from a conductor into the atmosphere. It is sometimes accompanied by the production of ozone.

silent period—An hourly period during which ship and shore radio stations must remain silent and listen for distress calls.

silica gel—A moisture-absorbent chemical used for dehydrating waveguides, coaxial lines, pressurized components, shipping containers, etc.

silicon—1. A metallic element often mixed with iron or steel during smelting to provide desirable magnetic properties for transformer-core materials. In its pure state, it is used as a semiconductor. 2. A brittle, gray, crystalline chemical element that, in its pure state, serves as a semiconductor substrate in microelectronics. It is naturally found in compounds, such as silicon dioxide.

silicon bilateral switch—A device that has characteristics similar to those of the silicon unilateral switch, but exhibits the same characteristics in both directions.



Silicon bilateral switch.

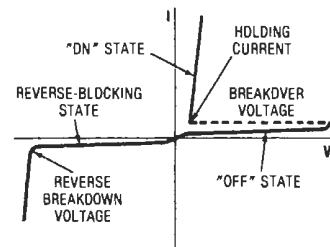
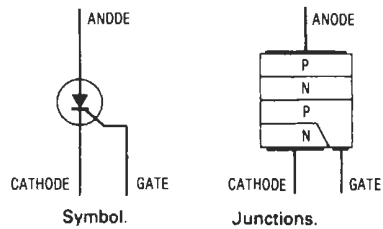
silicon capacitor—See varactor.

silicon cell—A solid-state device composed of silicon that is used to convert radiation into electrical energy.

silicon compiler—A software package that takes over chip creation from design to mask production.

silicon controlled rectifier—Abbreviated SCR. Also called reverse-blocking triode thyristor. 1. A four-layer pnpn semiconductor device that, when in its normal

state, blocks a voltage applied in either direction. The device is enabled to conduct in the forward direction when an appropriate signal is applied to the gate electrode. When such conduction is established, it continues even with the control signal removed until the anode supply is removed, reduced, or reversed. The SCR is the solid-state equivalent of the thyatron tube. 2. A semiconductor device that functions as an electrically controlled switch for dc loads. The SCR is one type of thyristor. 3. A reverse-blocking triode thyristor that can be triggered into conduction in only one direction. Terminals are anode, cathode, and gate. 4. A three-junction semiconductor device that is normally an open circuit until an appropriate gate signal is applied to the gate terminal, at which time it rapidly switches to the conducting stage. Its operation is similar to that of a gas thyatron, which conducts current in one direction only.



Anode characteristic.

Silicon controlled rectifier.

silicon controlled switch—Abbreviated SCS. A four-terminal pnpn semiconductor switching device; it can be triggered into conduction by the application of either a positive or negative pulse.

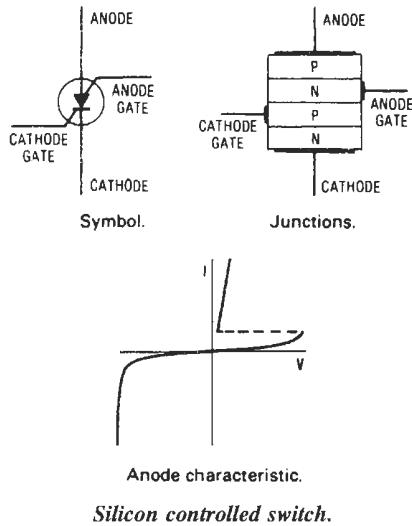
silicon detector—See silicon diode.

silicon diffused epitaxial mesa transistor—A silicon transistor that has high voltage and power ratings and low storage time and saturation voltage.

silicon diode—Also called a silicon detector. A crystal detector used for rectifying or detecting UHF and SHF signals. It consists of a metal contact held against a piece of silicon in a particular crystalline state.

silicon diode array tube—A highly sensitive vidicon-type tube used in CCTV cameras designed for low light level applications.

silicon dioxide—1. A compound that results from oxidizing silicon quartz. Selective etching of silicon dioxide makes possible selective doping for the generation of components in monolithic integrated circuits. 2. An abundant material found in the form of quartz and agate and as one of the major constituents of sand. The silicates of sodium, calcium, and other metals can be readily fused, and on cooling do not crystallize but instead form transparent material glass.



Silicon controlled switch.

silicon double-base diode — See unijunction transistor.

silicone — A member of the family of polymeric materials characterized by a recurring chemical group that contains silicon and oxygen atoms as links in the main chain. These compounds are presently derived from silica (sand) and methyl chloride. One of their important properties is resistance to heat.

silicon foundry — A facility that fabricates an integrated circuit from a design supplied by an independent party.

silicon gate — 1. An MOS process that uses silicon rather than metal as one of the transistor elements. This permits the use of lower operating voltages and increases the dynamic response of the device. 2. MOS technology that uses silicon as the metal for the gate of the transistor. An alternative is aluminum gate. 3. One of several methods for fabricating metal-oxide semiconductor circuits.

silicon-gate MOS — A process using polycrystalline silicon to replace the metal layer as the gate electrode. It offers high speed and low threshold.

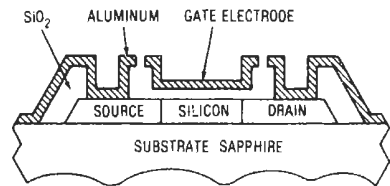
silicon monoxide — A dielectric material often used in the fabrication of a microelectronic device to form an insulator, substrate, or a thin-film capacitor dielectric.

silicon nitride — A compound that is deposited on the surface of a silicon monolithic integrated circuit to improve the stability of the integrated circuit. Silicon nitride is relatively impervious to some ions that penetrate silicon dioxide; best stability is obtained through the use of a combination of silicon nitride and silicon dioxide. Charge storage at the interface between layers of silicon nitride and silicon dioxide has resulted in memory devices in which the retention times are extremely long.

silicon on sapphire — Abbreviated SOS. Also called spinel. 1. A semiconductor manufacturing process in which a silicon layer is grown on a sapphire substrate. The silicon layer is divided into a number of electrically isolated islands for individual transistors. Silicon on sapphire is used for high-performance LSI circuits. 2. A semiconductor manufacturing process that uses an insulated material (sapphire) instead of silicon as a substrate on which the epitaxial layer is grown. With the process, MOS or bipolar performance can be significantly improved over that of conventional devices. 3. A fabrication technique in which thin crystalline films of silicon are deposited on a single crystal alumina (sapphire) substrate.

silicon double-base diode — silicon target

The thickness of SOS films is comparable with diffusion depths commonly used in MOS/LSI fabrication. Consequently, doping impurities penetrate completely through the silicon, so that the only component of the pn junction is that normal to the surface. Since the principal area contributions to a pn junction come from the underside and side walls of a diffusion well, the SOS vertical junction area—and, hence, capacitance—is reduced considerably. 4. A technology whereby MOSFETs are deposited on a sapphire substrate to increase the transistor switching speed. Silicon is grown on a passive insulating base (sapphire) and then selectively etched away to form a solid-state device.



Silicon-on-sapphire transistor.

silicon oxide — 1. A dielectric material commonly used in the surface passivation of microelectronic circuits. Silicon oxide contains various combinations of silicon monoxide and silicon dioxide. 2. Silicon monoxide or dioxide or a mixture, the latter of which can be deposited on a silicon IC as insulation between metalization layers.

silicon photodiode — Semiconductor pn or pin junction that utilizes absorbed photon energy in the range of 1.06 to 1.03 electronvolts to excite carriers from one energy level to a higher state. The resultant change in the charge across the junction is monitored as a current in the external photodiode circuit.

silicon planar transistor — A silicon transistor produced by the planar process and consisting of a series of etchings and diffusions to produce a transistor with a thin oxide layer within the planes of a silicon substrate.

silicon rectifier — 1. One or more silicon rectifying cells or cell assemblies. 2. Semiconductor diode that converts alternating current to direct current and which can be designed to withstand large currents and high voltages.

silicon rectifying cell — An elementary two-terminal silicon device that consists of a positive and a negative electrode and conducts current effectively in only one direction.

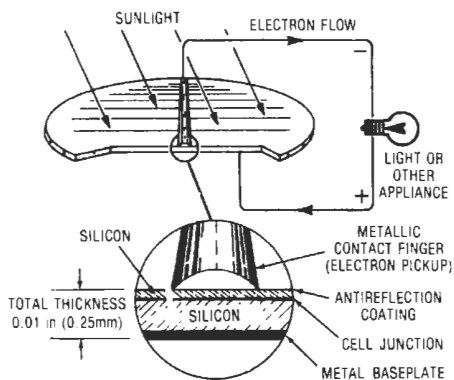
silicon solar cell — A photovoltaic cell designed to convert light energy into power for electronic and communication equipment. It consists essentially of a thin wafer of specially processed silicon.

silicon steel — Steel containing 3 percent to 5 percent silicon. Its magnetic qualities make it desirable for use in the iron cores of transformers and in other ac devices.

silicon surface-barrier detectors — Silicon radiation detectors based on a rectifying contact at the silicon's surface.

silicon symmetrical switch — A thyristor modified by the addition of a semiconductor layer to make the device into a bidirectional switch. It is used as an ac phase control for synchronous switching and control of motor speed.

silicon target — A high-sensitivity TV image pickup tube of the direct readout type utilizing a silicon diode array photoconductive target. Suitable for low-light applications. High sensitivity extends through the visible range.



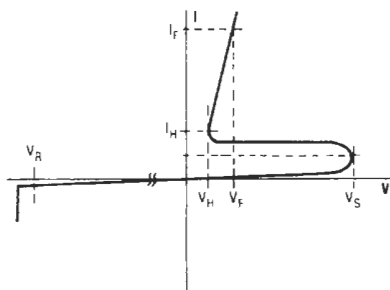
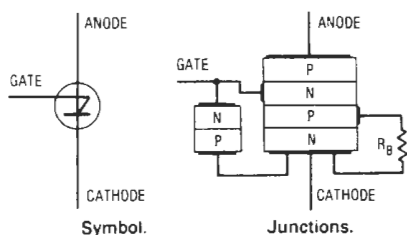
Silicon solar cell.

with extended sensitivity to the near-infrared region. Has low lag and high burn resistance.

silicon transistor—A transistor in which silicon is used as the semiconducting material.

silicon unijunction transistor—See unijunction transistor.

silicon unilateral switch—Abbreviated SUS. A device similar to the silicon-controlled switch, except that a Zener junction is added to the anode gate so that the silicon unilateral switch is triggered into conduction at approximately 8 volts. The SUS can also be triggered by application of a negative pulse to the gate.



Anode characteristic.

Silicon unilateral switch.

Silicon Valley—Also called Silicon Gulch. The area around Sunnyvale, California, where most of the American semiconductor manufacturers are located.

silk-covered wire—A wire covered with one or more layers of fine floss silk. It is a better insulator than cotton. Also, it is more moisture-resistant and permits more turns of wire within a given space.

silk screen—A screen of a closely woven silk mesh stretched over a frame and used to hold an emulsion outlining a circuit pattern and used in screen printing of film circuits. Used generally to describe any screen (stainless steel or nylon) used for screen printing.

silver—A precious metal that is more conductive than copper. Because it does not readily corrode, it is used for contact points of relays and switches. Its chemical symbol is Ag.

silvered-mica capacitor—A mica capacitor that has a coating of silver deposited directly on the mica sheets instead of using conducting metal foil.

silvering—See silver spraying.

silver migration—A process by which silver in contact with an insulating surface, under conditions of high humidity and with an electrical potential applied, is removed ionically from one location and redeposited as a metal in another location. This transfer results in reduced insulation resistance and dielectric failure.

silver oxide cell—A small dry cell giving a constant voltage of 1.5 volts. Used in low-current applications, such as hearing aids, calculators, and electric watches. It consists of a pure zinc anode, a depolarizing silver oxide cathode, and a potassium hydroxide or sodium hydroxide electrolyte.

silver solder—A solder that is composed of copper, silver, and zinc. It has a melting point lower than that of silver, but higher than that of lead-tin solder.

silver soldering—Brazing with a silver-based filler metal.

silver spraying—Also called silvering. Metallizing the surface of an original master disc recording by using a dual spray nozzle in which ammoniated silver nitrate and a reducer are combined in an atomized spray to precipitate the metallic silver.

silverstat—An arrangement of closely spaced contactors. Sometimes used as a step-by-step device to unbalance the arms of a resistance bridge.

silverstat regulator—A multitapped resistor whose taps are connected to single-leaf silver contacts. Variation of voltage causes a solenoid to open or close these contacts, shorting out more or less of the resistance in the exciter circuit as a means of regulating the output voltage to the desired value.

simple buffering—A technique for buffer control such that the buffers are assigned to a single data control block and remain assigned to it until it is closed.

simple-gate IC—An integrated circuit that consists of one or more gate circuits formed on a single chip. The input and output of each gate are brought out to separate pins on the integrated-circuit package.

simple harmonic current—Also called sinusoidal current. A symmetrical alternating current whose instantaneous value is equal to the product of a constant and the sine or cosine of an angle having a value varying linearly with time.

simple harmonic electromotive force—A symmetrical alternating electromotive force that is equal to the product of a constant and the cosine or sine of an angle that varies linearly with time.

simple harmonic motion—A periodic motion whose displacement varies as a sinusoidal function of time.

simple quad—See s-quad.

simple scanning—Scanning of only one scanning spot at a time.

simple sound source—A source that radiates sound uniformly in all directions under free-field conditions.

simple steady-state vibration—A periodic motion made up of a single sinusoid.

simple target—In radar, a target whose reflecting surface does not cause the amplitude of the reflected signal to vary with the aspect of the target (e.g., a metal sphere).

simple tone—1. A sound wave whose instantaneous sound pressure is a simple sinusoidal function of time. 2. Also called a pure tone. A sound sensation characterized by its singleness of pitch.

simplex—1. Transmission in one direction only. 2. A transmission facility in which the transmission is restricted to only one direction. 3. A form of communications satellite operation that involves a communication in only one direction at a time (mainly for facsimile, television, and some data).

simplex channel—A path for electrical transmission of information in one direction between two or more terminals.

simplex coil—A repeating coil used on a pair of wires to derive a commercial simplex circuit.

simplex circuit—A two-wire metallic circuit from which a simplex circuit is derived, the metallic and simplex circuits being capable of simultaneous use.

simplex mode—Operation of a communication channel in one direction only, with no capability for reversing.

simplex modem—A two-wire modem that can transmit in only one direction.

simplex modem with backward channel—Two-wire modem that can transmit simultaneously in both directions, with the primary direction being reasonably high speed and the secondary (or backward) direction being rather low speed.

simplex operation—Communication that takes place in only one direction at a time between two stations. Included in this classification are ordinary transmit-receive or press-to-talk operation, voice-operated carrier, and other forms of manual or automatic switching from transmit to receive.

simplex software—One-way transmission of data. A program that can be in the form of ROM, floppy disk data, cassette data, or hard-copy (firmware), or in the form of a machine code or high-level language in RAM.

simplex transmission—Data transmission in one direction only.

simulate—1. To use the behavior of another system to represent certain behavioral features of a physical or abstract system. 2. To represent the functioning of a device, system, or computer program by another; e.g., to represent one computer by another, to represent the behavior of a physical system by the execution of a computer program, or to represent a biological system by a mathematical model. To represent, by imitation, the functions of one system or process by means of another. See emulate.

simulation—Also called digital simulation. 1. A type of problem in which a physical model and the conditions to which the model may be subjected are all represented by mathematical formulas. 2. The substitution of instrumentation (often a computer) for actual operational conditions, so that valid data can be obtained. 3. Modeling of the operation of a logic circuit by a computer program containing device models and topology information about their interconnections. 4. The technique of utilizing representative or artificial data to reproduce in a model various conditions that are likely to occur in the actual performance of a system. Frequently used to test the behavior of a system under operating policies. 5. Representation of either an abstract or a physical system's features by computer operations. Often the operating environment of a program must be simulated during

the software testing. 6. Modeling a target microprocessor with a software interpreter so that object code can be checked as if it were actually executing in the target microprocessor. Simulation usually can't duplicate timing problems, glitches, or microprocessor idiosyncrasies. Input/output devices are often simulated so microcomputer development can proceed before the actual devices are available. 7. Representation of physical systems by computers.

simulator—1. A device that represents a system or phenomenon and that reflects the effects of changes in the original so that it may be studied, analyzed, and understood from the behavior of that device. 2. A cross-computer program that allows the user to test the object program by simulating the action of the microcomputer when the actual circuitry is unavailable. Simulators often provide certain kinds of diagnostic information unavailable with a debugger program running on the actual microcomputer: warning of the overflow of a processor stack or of an attempt by the program to write into a location in the ROM, for example. They usually allow manipulation and display of the simulated microcomputer memory and CPU registers; setting of breakpoints, whereby processing can be stopped at a certain program address or when the program reads or writes into a specified memory location; and tracing, in which each instruction in a certain address range is printed out as it is executed. Often they provide timing information, such as the number of instructions or machine cycles executed from program start to stop. 3. Program that helps to evaluate a microprocessor by duplicating all logic operations within the software of a large computer. Software simulators are sometimes used in the debug process to simulate the execution of machine-language programs using another computer (often a time-sharing system). These simulators are especially useful if the actual computer is not available. They may facilitate the debugging by providing access to internal registers of the CPU that are not brought out to external pins in the hardware. 4. A device or a computer program that simulates the operation of another device or computer.

simulator program—A program that causes one computer to imitate the logical operation of another computer for purposes of measurement and evaluation. Primarily used to exercise program logic independent of hardware environment. Extremely useful for debugging logic prior to committing it to ROM.

simulcast—1. To broadcast a program simultaneously over more than one type of broadcast station, e.g., to broadcast a stereophonic program over an AM and FM station. 2. A program so broadcast.

simulcasting—Broadcasting a stereo program over an AM and FM station. An AM and FM tuner are required for stereo reception.

simultaneous—Pertaining to the occurrence of events at the same instant of time.

simultaneous access—See parallel access.

simultaneous computer—A computer in which there is a separate unit to perform each portion of the complete computation concurrently, the units being interconnected in a manner that depends on the computation. At different times during a run, a given interconnection carries signals that represent different values of the same variable. For example, the simultaneous computer is a differential analyzer.

simultaneous lobing—In radar, a direction-determining technique utilizing the received energy of two concurrent and partially overlapped signal lobes. The relative phase of power of the two signals received from a target is a measure of the angular displacement of the target from the equiphase or equisignal direction.

simultaneous transmission—Transmission of control characters or data in one direction at the same time that information is being received in the opposite direction.

SINAD or sinad—Abbreviation for signal-to-noise and distortion. 1. A measurement of the signal-to-noise ratio of a receiver system in which the signal level measurement includes the system noise and distortion: $(s + n + d)/n$.

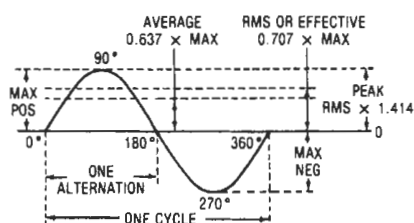
sine—The sine of an angle of a right triangle is equal to the side opposite that angle divided by the hypotenuse (the long side opposite the right angle).

sine galvanometer—An instrument resembling a tangent galvanometer except that its coil is in the plane of the deflecting needle. The sine of the angle of deflection will then be proportionate to the current.

sine law—The law which states that the intensity of radiation in any direction from a linear source varies in proportion to the sine of the angle between a given direction and the axis of the source.

sine potentiometer—A dc voltage divider (potentiometer) whose output is proportionate to the sine of the shaft-angle position.

sine wave—1. A wave that can be expressed as the sine of a linear function of time, space, or both. 2. A waveform (often viewed on an oscilloscope) of a pure alternating current or voltage. It is drawn on a graph of amplitude versus time or radial degrees and follows the rules of sine and cosine values in relation to angular rotation of an alternator. It can be simulated by means of an electronic oscillator. 3. The only waveform that cannot be considered to be a pulse. All other waveforms consist of more than one frequency, all harmonically related. A sine wave has a single frequency and therefore occupies a very small bandwidth. It passes through circuitry of any bandwidth with no change in waveform, but it may be changed in amplitude.



Sine wave.

sine-wave modulated jamming—A jamming signal consisting of a cw signal modulated by one or more sine waves.

singing—1. An undesired self-sustained oscillation at a frequency in or above the passband of a system or component. 2. An unwanted self-sustained audio-frequency oscillation in an audio system or device.

singing margin—Also called gain margin. The excess of loss over gain around a possible singing path at any frequency, or the minimum value of such excess over a range of frequencies.

singing point—1. The condition of a circuit or transmission path where the sum of the gains exceeds the sum of the losses. When expressed in decibels, it is the gain that can be added to the circuit equivalent before singing will begin. 2. The amount of total gain in the transmission system (most commonly used in connection with two-wire repeaters) that causes the system to begin to

lose efficiency of performance because the self-oscillating point is too closely approached. 3. The singing point of a circuit that is coupled back to itself is the point at which the gain is just sufficient to make the circuit break into oscillation.

singing-stovepipe effect—Reception and reproduction of radio-signal modulation by ordinary pieces of metal, such as sections of stovepipe, in contact with each other. It is caused by mechanically poor connections, such as rusty bolts or faulty welds, that act as nonlinear diodes and produce intermodulation distortion when subjected to strong radiated fields near transmitters.

single-address code—An instruction that contains the location of the data as well as the operation or sequence of operations to be performed on this data.

single amplitude—With reference to vibratory conditions, the peak displacement of an oscillating structure from its average or mean position.

single-anode tank—See single-anode tube.

single-anode tube—Also called a single-anode tank. An electron tube with one anode (used chiefly for pool-cathode tubes).

single-assignment language—A programming language that allows only one value to be assigned to a variable in a single expression.

single-axis gyro—A type of gyro in which the spinning rotor is mounted in a gimbal arranged so as to tilt about only one axis relative to the stable element.

single-board microcomputer—Also called monoboard microcomputer. A single printed circuit board containing, as a minimum, processor, memory (ROM and/or RAM), and input/output—usually a combination of serial and parallel ports. May also include a counter/timer function and bus interconnection scheme. A single-board microcomputer family may also include other functional system elements (such as memory and I/O functions) on circuit boards of the same format as the microcomputer board.

single-button carbon microphone—A microphone having a carbon-filled buttonlike container on one side of its flexible diaphragm. As the sound waves move the diaphragm, the resistance of the carbon changes, and the microphone current constitutes the desired audio-frequency signal.

single-carrier FM recording—The method of recording in which the input signal is frequency modulated onto a carrier and the carrier is recorded on a single track at saturation and without bias.

single-channel—A carrier-only or single-tone modulated radio control transmitter and matching receiver installation.

single-channel monopulse tracking system—See monopulse tracking.

single-channel simplex—Nonsimultaneous communication between stations over the same frequency channel.

single circuit—A telegraph circuit capable of non-simultaneous two-way communication.

single-circuit system—An alarm circuit that routes only one side of the circuit through each sensor. The return may be through either ground or a separate wire.

single-conversion receiver—A receiver employing a superheterodyne circuit in which the input signal is downconverted once.

single crystal—A piece of material in which the crystallographic orientation of all the basic groups of atoms is the same.

single-degree-of-freedom system—A system for which only one coordinate is required to define the configuration of the system.

single-dial control — Control of a number of different devices or circuits by means of a single adjustment (e.g., in tuning all variable-capacitor sections of a radio receiver).

single-ended — Unbalanced, such as grounding one side of a circuit or transmission line.

single-ended amplifier — An amplifier in which only one tube or transistor normally is employed in each stage—or if more than one is used, they are connected in parallel so that operation is asymmetric with respect to ground.

single-ended input — Amplifier input configuration in which all analog inputs are referenced to system ground.

single-ended input impedance — The impedance between one amplifier input terminal and ground (with the other input terminal, if any, grounded for ac) when the amplifier is balanced.

single-ended input voltage — The signal voltage applied to one amplifier input terminal with the other input terminal at signal ground.

single-ended output voltage — The signal voltage between one amplifier output terminal and ground.

single-ended push-pull amplifier circuit — An amplifier circuit having two transmission paths designed to operate in a complementary manner and connected to provide a single unbalanced output. (No transformer is used.)

single-ended signal — As opposed to a difference-mode signal, a signal that is at ground potential when it is at zero level.

single-ended tube — A metal tube in which all electrodes—including the control grid—are connected to base pins and there is no top connection. The letter *S* after the first numerals in a receiving-tube designation (e.g., 6SN7) indicates a single-ended tube.

single-ended voltage gain — Within the linear range of an amplifier, the ratio of a change in output voltage to the corresponding change in single-ended input voltage.

single-frequency duplex — A method that provides communications in opposite direction over a single-frequency carrier channel, but not at the same time. The change between transmitting and receiving conditions is controlled automatically by the voices of the communicating parties.

single-frequency simplex — A system of single-frequency carrier communications in which the change from transmission to reception is accomplished by manual rather than automatic means.

single-grip terminal — A solderless terminal designed to permit a crimp to the wire only.

single-groove stereo — See monogroove stereo.

single-gun color tube — A color picture tube with a single electron gun that produces only one beam, which is sequentially deflected across the phosphor dots.

single harmonic distortion — The ratio of the power at the fundamental frequency measured at the output of the transmission system considered to the power of any single harmonic observed at the output of the system because of its nonlinearity, when a single-frequency signal of specified power is applied to the input of the system. It is expressed in decibels.

single-hop propagation — Transmission in which the radio waves are reflected only once in the ionosphere.

single in-line package — See SIP.

single-junction photosensitive semiconductor — Two layers of semiconductor materials with an electrode connection to each material. Light energy controls the amount of current.

single-line diagram — Also called single-line drawing. A form of schematic diagram in which single lines are used to show component interconnections even though two or more conductors are required in the actual circuit.

single-line telephone — A telephone that provides access to one telephone line.

single-loop feedback — A loop in which feedback may occur only through one electrical path.

single-mode fiber — 1. A fiber waveguide that supports only one mode of propagation. 2. An optical glass fiber that consists of a step core of very small diameter, approximately 6 μm , and a cladding approximately 20 times the thickness of the core. Tremendous information rates (great bandwidth) are possible with single-mode fibers. The primary disadvantages of this type of fiber are cost of manufacture, difficulty in launching signals into the fiber, and difficulty in splicing and general handling in the field.

single-operand instruction — An instruction containing a reference to one register, memory location, or device.

single-phase circuit — Either an alternating-current circuit with only two points of entry, or one with more than two points of entry but energized in such a way that the potential differences between all pairs of points of entry are either in phase or 180° out of phase. A single-phase circuit with only two points of entry is called a single-phase two-wire circuit.

single-phase synchronous generator — A generator that produces a single alternating electromotive force at its terminals.

single phasing — The tendency of the rotor (of a motor tach generator) to continue to rotate when one winding is opened and the other winding remains excited.

single-point ground — See unground.

single-point grounding — A grounding system that attempts to confine all return currents to a network that serves as the circuit reference. It does not imply that the grounding system is limited to one earth connection. To be effective, no appreciable current is allowed to flow in the circuit reference; i.e., the sum of the above return currents is zero.

single-polarity pulse — A pulse that departs from normal in one direction only.

single pole — A contact arrangement in which all contacts in the arrangement connect, in one position or another, to a common contact.

single-pole, double-throw — Abbreviated SPDT. A three-terminal switch or relay contact for connecting one terminal to either of two other terminals.

single-pole-piece magnetic head — A magnetic head with only one pole piece on one side of the recording medium.

single-pole, single-throw — Abbreviated SPST. 1. A two-terminal switch or relay contact that either opens or closes one circuit. 2. A switch with only one moving and one stationary contact. Available either normally open (no) or normally closed (nc).

single rail — The method of data transfer in a computer on only one line or wire. The device at the destination must be able to handle the data in either the high-level or low-level value. The return path is by way of common or ground.

single-rank binary — A flip-flop that requires no more than one full clock pulse from a single clock system to transfer the logic from a synchronous input to the output of the binary. It contains only one memory stage.

single sampling plan — The plan that consists of a single sample size with associated acceptance and rejection criteria.

single-shield solid enclosure—An all-metal enclosure providing higher attenuation than cell-type units. It is usually a rigid, free-standing enclosure.

single-shot—See monostable.

single-shot blocking oscillator—A blocking oscillator modified to operate as a single-shot trigger circuit.

single-shot multivibrator—Also called a single-trip multivibrator. 1. A multivibrator modified to operate as a single-shot trigger circuit. See also monostable multivibrator. 2. A monostable multivibrator that, after being triggered to the quasi-stable state, will "flop" back by itself to the stable state after a certain period of time.

single-shot trigger circuit—Also called a single-trip trigger circuit. A trigger circuit in which the pulse initiates one complete cycle of conditions, ending with a stable condition.

single sideband—Abbreviated SSB. An AM radio transmitter technique in which only one sideband is transmitted. The other sideband and the carrier are suppressed. This gives SSB a 6:1 efficiency advantage over AM, and, thus, greater range per watt of output power. SSB occupies half of a conventional AM (double-sideband) channel.

single-sideband filter—A bandpass filter in which the slope on one side of the response curve is greater than on the other side. So called because it is used in systems to suppress a carrier frequency and transmit one or both sidebands.

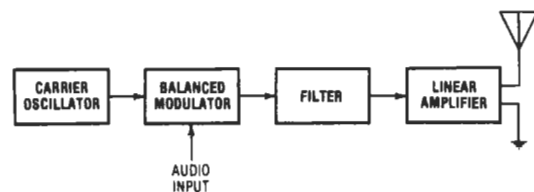
single-sideband modulation—1. Modulation whereby the spectrum of the modulating wave is translated in frequency by a specified amount, either with or without inversion. 2. A form of amplitude modulation in which only one of the two sidebands is transmitted. Either of the two sidebands may be transmitted, and the carrier may be transmitted, reduced, or suppressed.

single-sideband suppressed carrier—Modulation resulting from the partial or complete elimination of the carrier and all components of one sideband from an amplitude-modulated wave.

single-sideband system—A type of radiotelephone service in which one set of sidebands (either the upper or lower) is completely suppressed and the transmitted carrier is partially suppressed.

single-sideband transmission—Transmission of only one sideband, the other sideband being suppressed. The carrier wave may be transmitted or suppressed.

single-sideband transmitter—A transmitter in which only one sideband is transmitted.



Single-sideband transmitter.

single-signal receiver—A superheterodyne receiver equipped for single-signal reception. A highly selective filter is placed in the intermediate-frequency amplifier, and provision is included for varying the selectivity of the receiver to suit the requirements of the band condition.

single-signal reception—Use of a piezoelectric quartz crystal and associated coupling circuits as a crystal

filter to provide the high degree of selectivity required for reception in a crowded band.

single step—Pertaining to a method of computer operation in which each step is carried out in response to a single manual operation.

single-stroke bell—A bell that is struck once each time its mechanism is activated.

single-stub transformer—A shorted section of coaxial line connected to a main coaxial line near a discontinuity so that impedance matching at the discontinuity is achieved.

single-stub tuner—A section of transmission line that is terminated by a movable short-circuiting plunger or bar and that is attached to a main transmission line to provide impedance matching.

single sweep—The operating mode for a triggering-sweep oscilloscope in which the sweep must be reset for each operation, thus preventing unwanted multiple display; it is particularly useful for trace photography. In the interval after the sweep is reset and before it is triggered, the oscilloscope is said to be armed.

single throw—A contact arrangement in which each contact form included is a single contact pair.

single-throw circuit breaker—A circuit breaker in which only one set of contacts need be moved to open or close the circuit.

single-throw switch—A switch in which only one set of contacts need be moved to open or close the circuit.

single-tone keying—Keying in which the carrier is modulated with a single tone for one condition, either marking or spacing, but is unmodulated for the other condition.

single-track magnetic system—A magnetic-recording system whose medium has only one track.

single-track recorder—A tape recorder that records or plays only one track at a time on or from the tape. See also monaural recorder.

single-trip multivibrator—See single-shot multivibrator.

single-trip trigger circuit—See single-shot trigger circuit.

single-tuned amplifier—An amplifier characterized by resonance at a single frequency.

single-tuned circuit—A circuit that may be represented by a single inductance and capacitance, together with associated resistances.

single-turn potentiometer—A potentiometer in which the slider travels the complete length of the resistive element with only one revolution of the shaft.

single-unit semiconductor device—A semiconductor device having one set of electrodes associated with a single carrier stream.

single-wire line—A transmission line that uses the ground as one side of the circuit.

single-wound resistor—A resistor in which only one layer of resistance wire or ribbon is wound around the base or core.

sink—In communication practice: 1. A device that drains off energy from a system. 2. A place where energy from several sources is collected or drained away. 3. Anything into which power of some kind is dissipated. 4. The component or network into which energy (usually current) flows. 5. A device that switches ground or minus to a load. The current flows from the load into the sensor. See interface, 2.

sinker—An n+ region that extends down from the collector contact area on an integrated transistor to the n+ island under the collector for the purpose of reducing the collector resistance.

sink load—A load with a current whose direction is away from its input. A sink load must be driven by a current sink.

sins—Acronym for ship's inertial navigational system; especially applicable to submarine use.

sinter—A ceramic material or mixture fired so that it is not completely fused but is a coherent mass.

sintered plate—A powder that holds the active plate material used for both the anode and cathode in secondary cells. This provides a large surface area for the active material, allowing better cycle life, higher discharge rates, and better efficiency than the pocket-type plate design.

sintering—1. The process in which metal or other powders are bonded by cold-pressing them into the desired shape and then heating them so that a strong, cohesive body is formed. 2. The welding together of powdered particles at temperatures below the melting or fusion point. Particles are fused together to form a mass, but the mass, as a whole, does not melt.

sinusoid—A curve having ordinates proportional to the sine of the abscissa.

sinusoidal—Varying in proportion to the sine of an angle or time function (e.g., ordinary alternating current).

sinusoidal current—See simple harmonic current.

sinusoidal electromagnetic wave—In a homogeneous medium, a wave with an electric field strength proportionate to the sine (or cosine) of an angle that is a linear function of time, distance, or both.

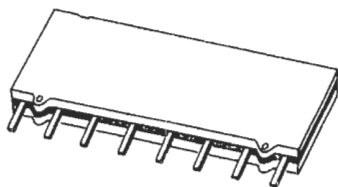
sinusoidal field—A field in which the magnitude of the quantity at any point varies as the sine or cosine of an independent variable such as time, displacement, or temperature.

sinusoidal quantity—A quantity that varies in the manner of a sinusoid.

sinusoidal vibration—A cyclical motion in which the object moves linearly. The instantaneous position is a sinusoidal function of time.

sinusoidal wave—A wave whose displacement varies as the sine (or cosine) of an angle that is proportional to time, distance, or both.

SIP—Abbreviation for single in-line package. 1. A package having a single row of external leads, usually mounted vertically with leads through the printed circuit board, but can be surface mounted with leads bent in gull-wing fashion. 2. A package for electronic components that is suited for automated assembly into printed circuit boards. The SIP is characterized by a single row of external connecting terminals, or pins, which are inserted into the holes of the printed circuit board.



Single in-line package.

SI system—International System of Units. Includes mks and mksa units.

site error—In navigation, the error that occurs when the radiated field is distorted by objects near navigational equipment.

situation-display tube—A large cathode-ray tube used for displaying tubular and vector information having to do with the various functions of an air-defense mission.

six-phase circuit—A combination of circuits energized by alternating electromotive forces that differ in phase by one-sixth of a cycle (60°).

size control—On a television receiver, a control that varies the size of the picture either horizontally or vertically.

skating—The tendency of a pivoted tonearm to be pulled to the center spindle. It is caused by friction between the stylus and the record surface.

skating force—A frictional force between a pickup stylus and the record material, tending to move the pickup toward the center of the record. It is present only when the cartridge is offset at an angle to reduce tracking error, and is a function of tracking force, offset angle, stylus size and shape, record material, and recorded amplitude. In a stereo recording, the effect of skating force is to increase the stylus-to-groove contact force on the left channel and decrease it on the right channel.

skein winding—A method of winding single-phase motors in which each pole is a long skein of wire, formed by winding around two headless nails or bolts (smooth) set some distance apart on a piece of wood. The entire pole is wound in place by twisting the coil to form a concentric chain. No internal connection is made between coils of the same pole. The winding is measured with a single turn of wire; then, using this endless wire, the location of the winding pins can be found.

skeletal coding—Sets of computer instructions in which some addresses and other parts are undetermined. These items usually are determined by routines designed to modify them according to given parameters.

skew—1. In facsimile, the nonrectangular received frame due to asynchronism between the scanner and recorder. Numerically it is the tangent of the angle of this deviation. 2. The motion characterized on a magnetic tape by an angular velocity between the gap center line and a line perpendicular to the tape center line. 3. In magnetic thin film, the deviation of the easy axis during fabrication. 4. The angular displacement of a printed character, character group, or other data from the intended or ideal placement. 5. A measure (expressed in percent) of the departure of each individually received DTMF signal frequency from its nominal value. A function of component tolerances, aging, environmental conditions, and certain types of transmission-multiplexing equipment, skew is measured at the DTMF receiver. 6. The time difference between the logic-state changes on different input pins within a particular test pattern. 7. The time difference of corresponding digital information on separate lines, measured at the rising or falling edges of the digital data.

skewed distribution—A frequency distribution of any natural phenomenon in which zero or infinity is one of its limits.

skewing—The time delay or offset between two signals with respect to each other.

skewness—A statistical measure of the asymmetry existing in a distribution.

skew ray—A ray that is skewed to the axis of an optical fiber. If the fiber is straight, a skew ray travels along a helical path around, but not crossing, the fiber's axis.

skiatron—1. A dark-trace oscilloscope tube. See also dark-trace tube. 2. A display employing an optical system with a dark-trace tube.

skin antenna—A flush-mounted aircraft antenna made by isolating a portion of the metal skin of the aircraft with insulating materials.

skin depth—Also called depth of penetration. In a current-carrying conductor, the depth below the surface at which the current density has decreased one neper below the current density at the surface; that is, the field has decreased to $1/e$ (36.8 percent) of its surface value.

skin effect—Also called radio-frequency resistance. 1. The tendency of rf currents to flow near the surface of a conductor. Thus, they are restricted to a small part of the total sectional area, which has the effect of increasing the resistance. 2. The phenomenon that occurs when an alternating current forces the ac current to flow mostly in the outer parts of a conductor. 3. The phenomenon in which the depth of penetration of electric currents into a conductor decreases as the frequency increases. 4. A characteristic of current in a conductor whereby as the frequency increases more and more current flows near the conductor surface and less at the center.

skinner—A wire brought out at the end of a cable prepared for soldering to a terminal.

skinning—Peeling the insulation from a wire.

skin tracking—Radar tracking of an object without the aid of a beacon or other signal device on board the object.

skip—1. A digital-computer instruction to proceed to the next instruction. 2. In a computer, a "blank" instruction. 3. To ignore one or more of the instructions in a sequence. 4. Term referring to propagation of radio signals over considerable distances due to reflection back to earth from the ionosphere.

skip distance—The distance separating two points on the earth between which radio waves are transmitted by reflection from the ionized layers of the ionosphere.

skip fading—Fading due to fluctuations of ionization density at the place in the ionosphere where the wave is reflected, which causes the skip distance to increase or decrease.

skip-if-set instructions—In computers, a class of instructions in which provision is made for examining particular logic conditions. Usually they are used in conjunction with a jump (branch) instruction. For example, a skip-if-word-register-ready instruction would allow the program to check for a ready condition of the word register and then permit the program to continue along one of two different paths, depending on the condition of the word register.

skip keying—The reduction of the radar pulse-repetition frequency to a submultiple of that normally used, to reduce the mutual interference between radars or to increase the length of the radar time base.

skip zone—Also called zone of silence. A ring-shaped space or region within the transmission range wherein signals from a transmitter are not received. It is the distance between the farthest point reached by the ground wave and the nearest point at which the refracted sky waves come back to earth.

skirt selectivity—A measure of the resolution capability of a spectrum analyzer when displaying signals of unequal amplitude. A unit of measure would be the bandwidth at some level below the 6-dB down points.

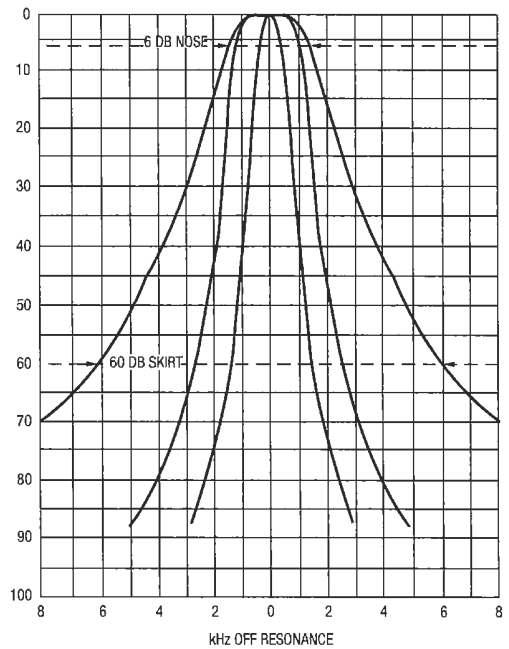
SKU—Stockkeeping unit. Abbreviation used in many computer reports to define an individual stock item.

sky error—See ionospheric error.

sky hook—Amateur term for antenna.

sky noise—1. Noise produced by radio energy from stars. 2. Background microwave radiation coming from deep space. It can be a noise source for dish antennas and sets a lower boundary for the possible noise temperature of any dish antenna of approximately 16 to 20 K.

sky wave—See indirect wave; ionospheric wave.



Skirt selectivity.

sky-wave correction—In navigation, a correction for sky-wave propagation errors applied to measured positional data. The amount of the correction is established on the basis of an assumed position and on the height of the ionosphere.

sky-wave station error—In sky-wave-synchronized loran, the station-synchronization error due to the effect of the ionosphere on the synchronizing signal transmitted from one station to the other.

sky-wave-synchronized loran—A loran system in which the range is extended by using ionosphere-reflected signals for synchronizing the two ground stations.

sky-wave transmission delay—The longer time taken by a transmitted pulse when carried by sky waves reflected once from the E layer compared with the same pulse carried by ground waves.

slab—A relatively thick crystal from which blanks are cut.

slab line—A double-slotted coaxial line whose outer shield has been unwrapped and extended to infinity in both directions so that the resulting configuration is a cylindrical conductor between two parallel conductors.

slab wafer—A slice of semiconductor material that has straight edges, as opposed to a conventional rounded wafer that has 21 percent less area than a square with comparable dimensions.

slant range—1. In radar, the line-of-sight distance from the measuring point to the target, particularly an aerial target. 2. Line-of-sight distance between two points not at the same elevation.

slap-back—An echo effect wherein the original signal reappears as distinct echoes that decay in level each time they appear. One way of creating slap-back is to feed the output signal from the play head back into the record head, at a slightly lower level. For example, if the sound "la" is originally fed to the recorder, then "la-la-la ... la" will be heard, with each "la" slightly lower in level until the signal fades away.

slave—1. A component in a system that does not act independently, but only under the control of another similar component. 2. A device that follows an order given by a master remote control.

slave antenna—A directional antenna that is positioned in azimuth and elevation by a servo system. The information controlling the servo system is supplied by a tracking or positioning system.

slave drive—See follower drive.

slaved tracking—A method of interconnecting two or more regulated power supplies so that the master supply operates to control other power supplies called slaves.

slave operation—A method of interconnecting two or more stabilized power supplies so that coordinated control of the assembly by controlling the master supply alone is achieved, and essentially proportional outputs are obtained from all units.

slave relay—See auxiliary relay, 2.

slave station—1. A radionavigational station whose emissions are controlled by a master station. 2. A device on a communication facility that is prevented from initiating transmission in order to organize and control communications between two or more stations.

slave sweep—A time base that is synchronized or triggered by a waveform from an external source. It is used in navigational systems for displaying or utilizing the same information at different locations, or in displaying or utilizing different information with a common or related time base.

slaving—The use of a torque to maintain the orientation of the spin axis of a gyro relative to an external reference such as a pendulum or magnetic compass.

sleeping sickness—In transistors, the gradual appearance of leakage.

sleeve—1. A cylindrical contacting part, usually placed in back of the tip or ring of a plug and insulated from it. 2. An iron core (usually a thin-walled cylinder) used as an electromagnetic shield around an inductor. 3. A lead tube placed over cable conductors that have been spliced. 4. A tube of woven cotton pushed over a twisted wire joint in a cable. 5. A brass or copper tube or paired tubes for fastening line or drop wires together by twisting, crimping, or rolling. 6. A tube of copper or iron placed over a relay winding to make the relay slow acting.

sleeve antenna—A vertical half-wave antenna whose lower half is a metallic sleeve through which the concentric feed line runs. The upper radiating portion, which is one-quarter wavelength, is connected to the center of the line.

sleeve-dipole antenna—A dipole antenna with a coaxial sleeve around the center.

sleeve-stub antenna—An antenna consisting of half of a sleeve-dipole antenna projecting from an extended conducting surface.

sleeve wire—1. A third conductor when associated with a pair. 2. Wire that connects to the sleeve of a plug or jack. By extension, it is common practice to designate by this term the conductors having similar functions or arrangements in circuits where plugs or jacks may not be involved.

sleeving—Any preformed tubular insulation, of braided or extruded construction, that is intended for placement over portions of cables or conductors during their installation to insulate them or hold them together.

slewing—1. Rapid change of a mechanism associated with either end of a data-transmission system when it stops following one target and takes up another. 2. In random-sampling-oscilloscope technique, the process of incrementally delaying successive samples or a set of samples with respect to the signal under examination.

slewing rate—See slew rate.

slew range—1. The high-speed range in which a motor can run continuously but cannot stop, start, or reverse without losing step count. 2. The maximum stepping rate at which a stepper motor will run without losing synchronism with the field.

slew rate—Also called rate limit or voltage velocity limit. 1. The maximum rate of change of the output voltage of an amplifier operated within its linear region. 2. The maximum rate of change of the output voltage of a closed-loop amplifier under large-signal conditions (the conditions that exist when an ac input voltage causes saturation of an amplifier stage, resulting in current limiting of that stage). 3. The maximum rate at which an amplifier output can be driven between limits in response to a step change in input voltage while accurately reproducing the input waveform. Usually measured in volts per second or volts per microsecond. For example, a 0.5-V/ μ s slew rate means that the output rises or falls no faster than 0.5 V every microsecond. Slew rate is caused by current limiting and saturation of an op-amp internal stage. That limited current is the maximum current available to charge the compensation capacitance network. 4. The rate at which the output can be driven from limit to limit under overdrive conditions. Generally specified in volts per microsecond. 5. The rate at which an amplifier follows a fast-rising waveform. Usually measured in volts per microsecond. 6. In a sample-and-hold circuit, the fastest rate at which the sample hold output can change. Specified in volts per microsecond.

slew torque—See running torque.

SLIC—Acronym for Subscriber Line Interface Circuit. 1. In digital transmission of voice, the circuit that performs some or all of the interface functions at the central office. See BORSCHT. 2. An analog device incorporated in a telephone transmission network and in the interface of a telephone with a central office. It also performs conversions from the two-wire subscriber loop to the four-wire central-office switch, and vice versa.

slice—1. A single wafer cut from a silicon ingot and forming a thin substrate on which have been fabricated all the active and passive elements for multiple integrated circuits. A completed slice usually contains hundreds of individual circuits. See also chip, 2. 2. Those parts of a waveform between two given amplitude limits on the same side of the zero axis. 3. A type of chip architecture that permits the cascading or stacking of devices to increase word bit size.

slicer—Also called an amplitude gate or a clipper-limiter. A transducer that transmits only portions of an input wave lying between two amplitude boundaries.

slicked switch—An alacritized mercury switch in which the rolling surface has been treated with an oily material.

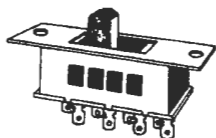
slideback—The technique of applying a dc voltage to one input of a differential amplifier in order to change the vertical position on the CRT screen of the signal applied to the other input.

slideback voltmeter—A vacuum-tube voltmeter that measures effective voltage values indirectly by measuring the change in grid bias voltage required to restore the plate current of the vacuum tube to the value it had before the unknown voltage was applied to the grid circuit.

slider—A sliding contact.

slide-rule dial—A tuning dial in which a pointer moves in a straight line over a straight scale. So called because it resembles a slide rule.

slide switch—A switch that is actuated by sliding a control lever from one position to another.



Slide switch.

slide wire—A bare resistance wire and a slider that can be set anywhere along the wire to provide a continuously variable resistance.

slide-wire bridge—A simplified Wheatstone bridge in which the resistance ratio is determined by the position of a slider on a resistance wire.

slide-wire rheostat—A long single-layer coil of a resistance wire with a sliding contact. The resistance is varied by moving the slider.

sliding contact—See wiping contact.

sliding load—A length of transmission line containing a matched electrical load at a distance from the connector end that can be varied.

sliding short—A length of transmission line containing an electrical short at a distance from the connector end that can be varied.

slip—1. The difference between the synchronous speed of a motor and the speed at which it operates. Slip may be expressed as a percentage or decimal fraction of synchronous speed or directly in revolutions per minute. 2. Distortion produced in a recorded facsimile image as a result of slippage in the mechanical drive system. 3. A method of interconnecting multiple wiring between switching units so that trunk 1 becomes the first choice for the first switch, trunk 2 becomes the first choice for the second switch, and so on.

slip process—See wet process.

slip ring—A device for making electrical connections between stationary and rotating contacts. See also collector rings.

slip-ring motor—Term usually applied to an induction motor with a wound secondary. (The correct term is a wound rotor motor.)

slip speed—The speed difference between speed at any load and the synchronous speed.

slope—1. The essentially linear portion of the grid-voltage, plate-current characteristic curve of a vacuum tube. This is where the operating point is chosen when linear amplification is desired. 2. See roll-off, 1. 3. The rate of attenuation of frequencies beyond the passband of a crossover network. Usually either 6 dB or 12 dB per octave of frequency.

slope-based linearity—A manner of expressing nonlinearity as the deviation from a straight line for which only the slope is specified.

slope detection—A discriminator operation on one of the slopes of the response curve for a tuned circuit. It is rarely used in FM receivers because the linear portion of the response curve is too narrow for large-signal operation.

slope detector—A detector in which slope detection is employed.

slot—1. One of the grooves formed in the iron core of a motor or generator armature for the conductors forming the armature winding. 2. A unit of time in a time-division multiplex (TDM) frame during which a subchannel bit or character is carried to the other end of the circuit and extracted by the receiving TDM unit. 3. That longitudinal position in the geosynchronous orbit into which a communications satellite is parked. Above the United States, communications satellites are typically

positioned in slots that are based at two- to three-degree intervals.

slot antenna—A radiating element formed by a slot in a conducting surface.

slot armor—An insulator in the slot of a magnetic core of a machine; it may be on the coil or separate from it.

slot cell—A formed sheet of insulation that is separate from the coil and placed in the slot of a magnetic core.

slot coupling—A method of transferring energy between a coaxial cable and a waveguide by means of two coincident narrow slots, one in the sheath of the coaxial cable. *E*- or *H*-waves are launched into the guide, depending on whether the cable and guide are parallel or perpendicular to each other.

slot-discharge resistance—See corona resistance.

slot effect—The minimum voltage of rated frequency applied to the control-voltage winding of a motor tach generator necessary to start the rotor turning at no-load conditions with rated voltage and frequency on the fixed-voltage winding.

slot insulation—Flexible sheet-type insulation inserted into the slots of armatures and stators to insulate the windings from the core.

slot radiator—A primary radiating element in the form of a slot cut in the walls of a metal waveguide or cavity resonator or in a metal plate.

slotted line—See slotted section.

slotted rotor plate—See serrated rotor plate.

slotted section—Also called a slotted line or slotted waveguide. A section of a waveguide or shielded transmission line, the shield of which is slotted to permit examination of the standing waves with a traveling probe.

slotted SWR measuring equipment—A device in which standing and/or reflected waves are measured with a slotted line and a detecting probe.

slotted waveguide—See slotted section.

slow-acting relay—See slow-operating relay.

slow-action relay—See time-delay relay.

slow death—The gradual change of transistor characteristics with time. This change is attributed to ions that collect on the surface of the transistor.

slowed-down video—A technique of transmitting radar data over narrow-bandwidth circuits. The radar video is stored over the time required for the antenna to move through one beam width, and is subsequently sampled at such a rate that all range intervals of interest are sampled at least once each beam width or once per azimuth quantum. The radar-return information is quantized at the gap-filler radar site.

slow memory—See slow storage.

slow-operate, fast-release relay—A relay designed specifically for a long make and short release time.

slow-operate, slow-release relay—A slow-speed relay designed specifically for both a long make and a long release time.

slow-operating relay—Also called slow-acting relay. A relay that is slow to attract its armature after its winding is energized. A copper slug, or collar, at the armature end of the core delays the operation momentarily after the operating circuit is completed. Such a relay is often marked SO on circuit diagrams.

slow-release relay—See slow-releasing relay.

slow-releasing relay—Also called a slow-release relay. A slow-acting relay in which a copper slug, or collar, at the heelpiece end of the core delays the restoration momentarily after the operating circuit is opened. Such a relay is often marked SR on circuit diagrams.

slow-scan television— Abbreviated SSTV.

slow-speed relay—A relay designed specifically for long operate or release time, or both.

slow storage— Also called slow memory. Computer storage in which the access time is relatively long. *See also* secondary storage.

slow-wave circuit—A microwave circuit in which the phase velocity of the waves is considerably below the speed of light. Such waves are used in traveling-wave tubes.

slow-wave structure—A circuit composed of selected inductance and capacitance that causes a wave to be propagated at a speed slower than the speed of light.

SLSI—Abbreviation for super large-scale integration (100,000 transistors per chip).

slug—1. A heavy metal ring or short-circuited winding used on a relay core to delay operation of the relay. 2. A metallic core that can be moved along the axis of a coil for tuning purposes.

slug tuner—A waveguide tuner containing one or more longitudinally adjustable pieces of metal or dielectric.

slug tuning—Varying the frequency of a resonant circuit by introducing a slug of material into the electric or magnetic fields, or both.

slumber switch—A circuit arrangement whereby a radio or a recorder automatic shutoff provision can be made to turn off the apparatus itself as well as any other equipment plugged into its ac outlet.

SMAC—Abbreviation for Scene Matching Area Correlator. An optical terminal homing system that matches images with stored maps.

small-business computer—1. A system with a price tag low enough to fit the budget of a small business, simple enough for clerks and typists to operate, yet sophisticated enough to perform a variety of complex transactions. 2. A computer that is affordable by a small business, rather than a relatively low-performance system for business.

small-scale integration—*See* SSI.

small-outline transistor—*See* SOT.

small signal—That value of an ac voltage or current which, when halved or doubled, will not affect the characteristic being measured beyond the normal accuracy of the measurement of that characteristic.

small-signal analysis—Consideration of only small excursions from the no-signal bias, so that a vacuum tube or transistor can be represented by a linear equivalent circuit.

small-signal characteristics—The characteristics of an amplifier operating in the linear amplification region.

small-signal current gain (current-transfer ratio)—The output current of a transistor with the output circuit shorted, divided by the input current. The current components are understood to be small enough that linear relationships hold between them.

small-signal drain-to-source on-state resistance—The small-signal resistance between the drain and source terminals of a field-effect transistor with a specified gate-to-source voltage applied to bias the device to the on state. For a depletion-type device, this gate-to-source voltage may be zero.

small-signal gain—The gain characteristics of an amplifier operating in the linear amplification region. Small-signal gain is typically measured at least 10 dB below the input power level that creates 1 dB gain compression.

small-signal open-circuit forward-transfer impedance—In a transistor, the ratio of the ac output voltage to the ac input current when the ac output current is zero.

small-signal open-circuit input impedance—

In a transistor, the ratio of the ac input voltage to the ac input current when the ac output current is zero.

small-signal open-circuit output admittance—In a transistor, the ratio of the ac output current to the ac voltage applied to the output terminals when the ac input current is zero.

small-signal open-circuit output impedance—In a transistor, the ratio of the ac voltage applied to the output terminals to the ac output current when the ac input current is zero.

small-signal open-circuit reverse-transfer impedance—In a transistor, the ratio of the ac input voltage to the ac output current when the ac input current is zero.

small-signal open-circuit reverse-voltage transfer ratio—In a transistor, the ratio of the ac input voltage to the ac output voltage when the ac input current is zero.

small-signal power gain—In a transistor, the ratio of the ac output power to the ac input power under specified small-signal conditions. Usually expressed in dB.

small-signal short-circuit forward-current transfer ratio—In a transistor, the ratio of the ac output current to the ac input current when the ac output voltage is zero.

small-signal short-circuit forward-transfer admittance—In a transistor, the ratio of the ac output current to the ac input voltage when the ac output voltage is zero.

small-signal short-circuit input admittance—In a transistor, the ratio of the ac input current to the ac input voltage when the ac output voltage is zero.

small-signal short-circuit input impedance—In a transistor, the ratio of the ac input voltage to the ac input current when the ac output voltage is zero.

small-signal short-circuit output admittance—In a transistor, the ratio of the ac output current to the ac output voltage when the ac input voltage is zero.

small-signal short-circuit reverse-transfer admittance—In a transistor, the ratio of the ac input current to the ac output voltage when the ac input voltage is zero.

small-signal transconductance—In a transistor, the ratio of the ac output current to the ac input voltage when the ac output voltage is zero.

smart terminal—1. *See* intelligent terminal. 2. A computer terminal that can do more than simply send data to a computer and display data from a computer. Depending on how many chips are built into it, a smart terminal can edit and temporarily store up to several thousand words, produce graphics, and even change the color of the background on its monitor.

smear—1. Television-picture distortion in which objects appear stretched out horizontally and are blurred. 2. Small frequency and time distortion introduced into a radio signal by a dispersive reflector such as the moon.

smectic phase—A parallel arrangement of liquid crystal molecules arranged in layers. The physical appearance of the smectic state is that of a highly viscous, turbid fluid.

S-meter—A meter provided in some communications receivers to give an indication of the relative strength of the received signal in terms of arbitrary units. It is calibrated in "S" units and decibels. Nominally, each S unit equals 6 dB. Above S9, most meters are calibrated in 10-dB increments. Sometimes a manufacturer will specify what input level (usually between 50 and 100 μ V) is required for a reading of S9. S-meters are intended to be relative, rather than absolute, indicators. They are useful

to an extent in comparing the strength of two stations, or the performance of two antennas at one location. *See also* signal-strength meter.

smileys—Also called emoticons. Little symbols in a text message meant to be viewed sideways; used to express emotion. Smileys are often used in e-mail messages and newsgroup postings. Examples include :) (happy), :-((sad), :-< (mad), :-o (wow!), :-@ (yell), and ;-) (wink).

Smith chart—A special polar diagram used in the solution of transmission-line and waveguide problems. It consists of constant-resistance circles, constant-reactance circles, circles of constant standing-wave ratio, and radius lines that represent constant line-angle loci.

smoke detector—A device that detects visible or invisible products of combustion. *See also* ionization smoke detector; photoelectric beam-type smoke detector; photoelectric spot-type smoke detector; resistance-bridge smoke detector.

smooth—To apply procedures that bring about a decrease in or the elimination of rapid fluctuations in data.

smoothing—Averaging by a mathematical process or by curve fitting, such as the method of least squares or exponential smoothing.

smoothing choke—An iron-core choke coil that filters out fluctuations in the output current of a vacuum-tube rectifier or direct-current generator.

smoothing circuit—Also called ripple filter. A combination of inductance and capacitance employed as a filter circuit to remove fluctuations in the output current of a vacuum-tube or semiconductor rectifier or direct-current generator.

smoothing factor—The factor expressing the effectiveness of a filter in smoothing out ripple voltages.

smoothing filter—1. Also called ripple filter. A filter used to remove fluctuations in the output current of a vacuum-tube or semiconductor rectifier or direct-current generator. 2. A low-pass filter in the vertical-deflection amplifier of a spectrum analyzer. It is used to smooth amplitude fluctuations in order to display spectral density and the average level of random signals as single lines. (The time constant of a smoothing filter is generally variable.)

SMPTE—Abbreviation for the Society of Motion Picture and Television Engineers. (Formerly it was the SMPE, Society of Motion Picture Engineers.)

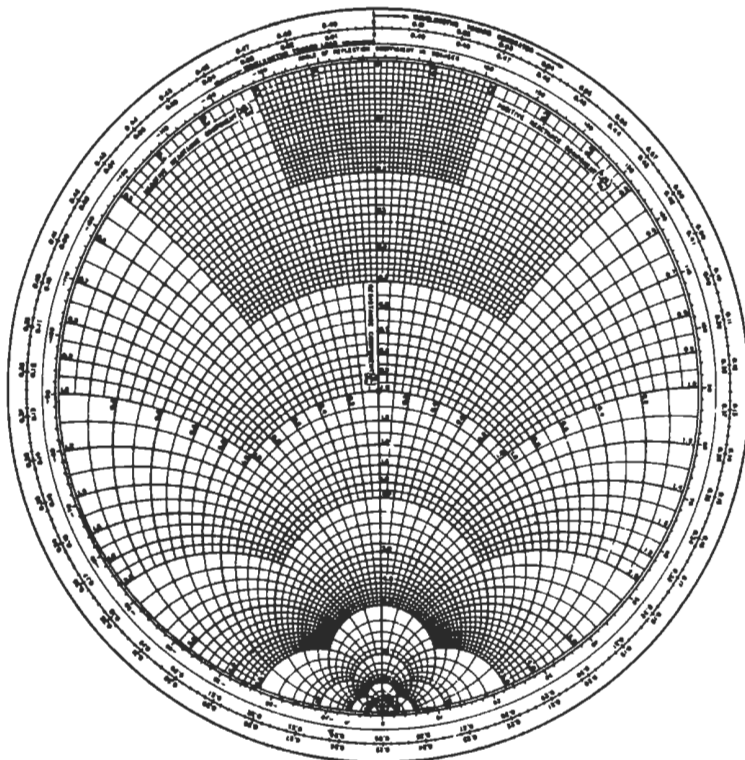
SMT—Abbreviation for surface-mount technology. The mounting of components on the surface of a printed circuit board; as contrasted with through-hole mounting, in which component leads extend through the board.

snake—A tempered steel wire, usually of rectangular cross section. The snake is pushed through a run of conduit or through an inaccessible space such as a partition and used for drawing in wires.

snap-acting switch—A switch in which there is a rapid motion of the contacts from one position to another position, or their return. This action is relatively independent of the rate of travel of the actuator.

snap-action—1. In a mercury switch, the rapid motion of the mercury pool from one position to another. 2. A rapid motion of the contacts from one position to another position, or their return (differential storing of energy). This action is relatively independent of the rate of travel of the actuator.

snap-action contacts—A contact assembly such that the contacts remain in one of two positions of equilibrium with substantially constant contact pressure



Smith chart.

during the initial motion of the actuating member until a point is reached at which stored energy causes the contacts to move abruptly to a new position of equilibrium.

snap magnet—A permanent magnet used in thermostatic, pressure, and other control instruments to provide quick make-and-break action at the contact and thereby minimize sparking. The magnet pulls the armature in suddenly against the spring to close the contacts and hold them closed until the spring is compressed enough to make them fly apart.

snap-off diode—A planar epitaxial passivated silicon diode that is processed in such a way that a charge is stored close to the junction when the diode conducts. Upon application of a reverse voltage, the stored charge forces the diode to switch quickly to its blocking state, or snap off.

snapshot—1. In a computer, a dynamic printout of selected data in storage that occurs at breakpoints and checkpoints during the computing operations, as opposed to a static printout. 2. A printout of intermediate results part way through a program run.

snapshot dump—A selective dynamic dump carried out at various points in a machine run.

snapshot routine—Special type of debugging routine that includes provisions for dynamic printout of selected data at various checkpoints in a computing operation.

snap-strate—A scribed substrate that can be processed by gang deposition in multiples of circuits and snapped apart afterward.

snap switch—A switch (e.g., a light switch) in which the contacts are separated or brought together suddenly as the operating knob or lever compresses or releases a spring.

snap varactor—See step-recovery diode.

sneak circuit—That part of a complete electrical circuit which carries an unintentional (sneak) current. Sneak currents may prevent proper operation of interconnected equipment.

sneak current—A leakage current that enters telephone circuits from other circuits; it is not strong enough to cause immediate damage, but it can produce harmful heating effects if permitted to continue.

sneak path—In computers, an unwanted circuit through a series-parallel configuration.

Snell's law—The sine of the angle of incidence divided by the sine of the angle of refraction equals a constant called the index of refraction when one of the media is air.

snooperscope—Also called snooperscope. 1. An instrument for seeing in the dark by means of infrared radiation. A high-aperture lens forms an image of distant objects on the photocathode of an infrared-sensitive image tube, the visible final image being viewed through a magnifier (eyepiece). The scene must be illuminated with infrared if such a tube is to be usable. These instruments find extensive use in warfare and also for operations in rooms that have to be kept dark because film emulsions are exposed. 2. A snooperscope attached to a rifle and used to aid in the sighting and shooting of targets in low-light-level conditions.

snivet—A straight, jagged, or broken vertical black line that appears near the right edge of the screen of a television receiver, caused by discontinuity in the plate-current characteristic of the horizontal amplifier tube under conditions of zero bias.

snivitz—A small pulse of noise. See also glitch.

snooperscope—1. A night viewing device to permit a user to see objects in total darkness. It consists of an infrared source, an infrared image converter, and a battery-operated high-voltage dc-to-dc converter. Infrared

radiation sent out is reflected back to the snooperscope, where it is then converted into a visible image on the fluorescent screen of the image-converter tube. 2. An instrument used for viewing in low levels of illumination by means of infrared radiation. A high-aperture lens forms an image of distant objects on the photocathode of an infrared-sensitive image tube, the visible final image being viewed through a magnifier. The scene must be illuminated with infrared energy. 3. See also sniperscope.

snow—Also known as sparklies. 1. A speckled background caused by random noise on an intensity-modulated display, such as alternate dark and light dots appearing randomly in a television picture (usually indicative of a weak signal). 2. Heavy random noise in a video picture.

snowflake transistor—A high-speed, medium-power switching transistor for use as a thin-film or core driver. It employs a six-pointed emitter geometry that permits the optimum ratio of emitter periphery to emitter area.

snow static—Precipitation static caused by falling snow.

SNR—Abbreviation for signal-to-noise ratio. 1. Expressed in decibels, it relates how much louder a signal is than the background noise. It is measured at the speaker, and is used in sensitivity ratings. Often, $(s + n)/n$ is used, as it is easier to measure; it is the ratio of the signal and background noise to the background noise, and will yield an apparently higher sensitivity than the s/n ratio. 2. Usable information in a signal (optical or electrical) compared to the noise that tends to interfere with the transmission of the information. Also abbreviated s/n ratio.

s/n ratio—See SNR.

snubber capacitor—A capacitor incorporated in a rapidly switched LC circuit to reduce EMI by lowering the circuit resonant frequency and characteristic impedance.

snubber circuit—1. A form of suppression network that consists basically of a series-connected resistor and capacitor connected in shunt with an SCR. The snubber circuit combined with the effective circuit series inductance controls the maximum rate of change of voltage and the peak voltage across the device when a stepped forward voltage is applied to it. 2. A circuit designed to reduce the sensitivity of a solid-state relay to spikes and other high- dV/dt transients in the load circuit voltage. Snubbers prevent false firing of solid-state relay switching elements. One such circuit is often referred to as an RC circuit.

SO—Abbreviation for small outline (package). Similar to a miniature plastic flat pack, but with gull-wing lead forms primarily or wholly constructed for surface mounting. Typical lead spacing is 0.05 inch.

SOA—Abbreviation for safe operating area.

soak—1. In an electromagnetic relay, the condition that exists when the core is approximately saturated. 2. To increase the current through a relay winding until the core is saturated with flux, and then hold the magnetization at that level for a certain time.

soakage—The inability of a capacitor to come up to voltage instantaneously without voltage lag or creep during or after charging. The lower the soakage, the lower the lag and creep.

soak time—1. The period of time required following activation for the electrolyte in a cell or battery to be sufficiently absorbed into the active materials. 2. The length of time a ceramic material (such as a substrate or thick-film composition) is held at the peak temperature of the firing cycle.

soak timer—A reset timer, usually dial-adjustable, as applied in a temperature-control system for controlling

the length of time the temperature is held at a predetermined level.

soak value—The voltage, current, or power applied to the coil of the relay coil to ensure that a condition approximating magnetic saturation exists.

socket—1. An opening that supports and electrically connects to vacuum tubes, bulbs, or other devices or components when they are inserted into it. 2. Also known as the female contact. A mechanical electrical connector.

socket adapter—A device placed between a tube and its socket so that the tube can be used in a socket designed for some other base, or so that current or voltage can be measured at the electrodes while the tube is in use.

socket connector—A connector that contains socket contacts and that receives a plug connector containing male contacts.

socket contact—A hollow female contact designed to mate with a male contact. It is normally connected to the live side of a circuit.

sodar—Acronym for sound detecting and ranging. A device that detects large changes in temperature overhead by the amount of sound returned as echoes (the colder the atmosphere, the louder the echoes). The sound, which is within the range of human hearing, is launched upward, and the echoes are changed into oscilloscope patterns.

sodium amalgam-oxygen cell—A fuel-cell system in which materials functioning in the dual capacity of fuel and anode are consumed continuously. Low operating temperatures and high power-to-weight ratios are significant characteristics of the system.

sodium-vapor lamp—A gas-discharge lamp containing sodium vapor. It is used chiefly for highway illumination.

sofar—Acronym for sound fixing and ranging. An underwater sound system with which air and ship survivors can be located within a square mile and as far as 2000 miles (3200 km) away. Survivors drop a TNT charge into the water. The charge, which is timed to explode at 3000 to 4000 feet (914 to 1220 m), sets up underwater sound waves that can be picked up by hydrophones at shore stations.

soft copy—Alphanumeric or graphical data, or both, presented in nonpermanent form, such as on a video screen.

soft error—1. An occasional random loss of data in a memory. The reason for the error is normally not identifiable, nor is it repeatable on a device tester. 2. A dynamic error normally caused by some transient condition. Retrying the failed operation will often result in successful completion. 3. Alteration of the information in a memory cell resulting from an alpha particle striking the cell.

soft key—A key on the terminal keyboard that may be labeled on the lower part of the terminal screen and whose function can be programmed.

soft magnetic material—Also called low-energy material. Ferromagnetic material that, once having been magnetized, is very easily demagnetized (i.e., requires only a slight coercive force to remove the resultant magnetism).

soft phototube—A gas phototube.

soft radiation—Term applied to radiation composed of particles or photons that will not easily penetrate a material because of their low energy levels.

soft soldering—Process of joining two metals with a fusible alloy or solder that melts below 800°F (427°C). See hard soldering.

soft start—A method of increasing the duty cycle of the switching element in a power supply from zero to its normal operating point during system startup. Using soft start eliminates output voltage overshoot and magnetizing

current imbalances in the transformer. See also warm boot.

soft tube—1. A high-vacuum tube that has become defective because of the entry of a small amount of gas. 2. An electronic tube into which a small amount of gas has purposely been put to obtain the desired characteristics.

software—1. Programs, routines, codes, and other written information for use with digital computers, as distinguished from the equipment itself, which is referred to as hardware. 2. A set of computer programs, procedures, rules, and associated documentation concerned with the operation of a data-processing system, e.g., compilers, monitors, editors, utility programs. 3. A computer program or set of programs held in some storage medium and loaded into read/write memory (RAM) for execution. 4. The set or package of programs that instructs a computer to perform certain predefined functions. 5. The user program that controls the operation of a programmable controller. 6. Totality of programs and routines used to extend the capabilities of computers, such as compilers, assemblers, narrators, routines, and subroutines. 7. The computer programs, procedures, and documentation concerned with the operation of a computer system, e.g., assemblers, compilers, operating systems, diagnostic routines, program loaders, manuals, library routines, and circuit diagrams. Software is the name given to the programs that cause a computer to carry out particular operations. Contrasted with hardware. 8. The modifiable (to some extent) binary bit patterns in the memory of a computer that control the operation of the processing portion of the computer. Software programs are usually written in one of three general classes of language: machine, assembler, or higher level. 9. A computer's programs. If a particular bit of data manipulation is done through a program rather than by special circuitry, it is said to be "in software." Doing things in software is cheap and flexible, since a program can be easily changed. 10. An expression for programs and also tapes or disks with recorded data. There are various kinds of software, including applications and executive. The executive is the "heart" of the system and is responsible for scheduling and controlling activity in the system. Applications or task programs perform specific functions whose activity is controlled by the executive. 11. Programs that control the operation of computer hardware. Operating systems, executives, monitors, compilers, editors, utility routines, and user programs are considered software.

software buffer—A location or set of locations in memory given by name by the resident program and used to hold information until it can be used.

software compatible—Describes an MPU that executes the same software as another one.

software documentation—Program listings and/or technical manuals describing the operation and use of programs.

software house—A company that offers software programs and support service to users. Such support can range from simply supplying manuals and other information to a complete counseling and computer part-time programming service.

software interrupt—The interruption of a user-level program in response to the acknowledgment of a hardware interrupt by the operating system. In high-level-language programs, software interrupts can safely occur only at the end of a program line.

software list—A document that defines all the next lower level modules that are contained in the module being documented.

software maintenance—1. Improvements and changes made in software. 2. The task of keeping software up to date and working properly.

software programmable—A system whose functions are defined by a program, generally supplied by the manufacturer, that may be redefined or updated by changing or replacing the program.

software tool—A computer program, rules, and associated documentation that assist a data-processing technologist in designing, developing, maintaining, and managing data and software.

software or computer numerical control—A numerical control system wherein a dedicated stored-program computer is used to perform some or all of the basic numerical control functions. The control program can be read in and stored from data on tape, cards, manual switches, etc. Changes in the response, sequence, and/or functions can be made by reading in a different control program.

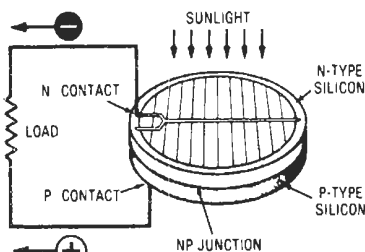
soft X-rays—X-rays with comparatively long wavelengths and, hence, poor penetrating power.

solar absorber—A surface that has the property of converting solar radiation into thermal energy.

solar absorption index—A quantity that relates the angle of the sun at different latitudes and local times with ionospheric absorption.

solar battery—A series of solar cells arranged to collect solar radiation and to generate a given amount of electrical energy.

solar cell—1. A device capable of converting light or other radiant energy directly into electrical energy. 2. Silicon photovoltaic cell that can be used to generate electricity from direct sunlight. Such cells are especially useful in space vehicles, for which no other source of electricity is available. 3. A photovoltaic cell designed to respond to wavelengths in solar radiation. Basically a semiconductor diode that absorbs light and converts it to electrical power. This ability depends on the material of the semiconductor and on the photovoltaic effect. In this effect a photon of solar radiation is absorbed by the semiconductor material by giving up its total energy to produce an excess charge carrier (electron or hole). The absorption can happen only if the photon energy is greater than the energy of the bandgap of the material—the difference between the conduction band and the valence band (the excited state and the ground state).



Solar cell.

solar concentrator—A device that increases the intensity of solar energy by optical means.

solar constant—The standard intensity of solar radiation impinging on the earth's atmosphere at the mean distance between earth and sun. It is the energy equivalent of 1.353 kilowatts of electricity per square meter. Under clear skies some 80 to 90 percent of this radiation reaches the ground; under heavy cloud cover, 10 percent or less. The average energy rate at the earth's surface is about 1 kW per square meter.

solar day—A day that contains exactly 24 hours (1440 minutes). During a solar day the sun rotates slightly more than 360° about its axis with respect to "fixed" stars. Compare sidereal day.

solar-energy conversion—The process of changing solar radiation into electrical or mechanical power, either directly or by using a heat engine.

solar furnace—An optical system that is designed to produce a high temperature in a specified area by the optical direction and concentration of solar radiation on that area. The system usually consists of a collecting system that may have reflective optics concentrators, or a combination of both, and a tracking system that keeps the collecting and directing system properly oriented to the sun.

solar noise—Electromagnetic radiation from the sun at radio frequencies.

solar radiation—Radiation from the sun that is made up of a very wide range of wavelengths, from the long infrared to the short ultraviolet, with its greatest intensity in the visible green at about 5000 angstroms (500 nm). The solar radiation received on the earth's surface is restricted to the visible and near infrared, since the air strongly absorbs the wavelengths located at either end of the spectrum.

solar simulation—The simulation of solar radiation in the infrared and ultraviolet spectrum for the analysis of extraterrestrial sunlight and its effects on spacecraft, materials, and components.

solder—1. A readily meltable metal or alloy that produces a bond at a junction of two metal surfaces. True solder must have a lower melting point than the metals being joined and must also be capable of uniting with the metals to be joined. 2. An alloy that melts at relatively low temperatures and is used to join or seal metals with higher melting points. Solder alloys melt over a range of temperatures; the temperature at which a solder begins to melt is the solidus, and the temperature at which it is completely molten is the liquidus.

solderability—The ability of a conductor to be "wetted" by hot solder and to form a strong low-resistance bond with the solder.

solder bumps—The round solder balls bonded to a transistor contact area and used to make connection to a conductor by face-down bonding techniques.

solder contact—A contact having a cup, hollow cylinder, eyelet, or hook to accept a wire for a conventional soldered termination.

solder cup—The end of a terminal or similar device into which a contact is inserted before being soldered.

solder dam—A dielectric composition screened across a conductor to limit molten solder from spreading farther onto solderable conductors.

solder eye—A solder-type terminal provided with a hole at its end through which a wire can be inserted prior to being soldered. A ring-shaped contact termination of a printed-circuit connector for the same purpose.

solder eyelet—An eyelet, or hole, in a contact through which a wire may be mechanically connected to the contact prior to soldering.

solder flux—A substance that transforms a passive, contaminated metal surface into an active, clean, solderable surface. Generally, all such fluxes should prevent oxidation during heating, lower interfacial surface tensions, be thermally stable, be easily displaced by molten solder, be noninjurious to components, remove easily if desired, remove oxide, and penetrate films.

solder ground—A conducting path to ground due to dripping or overhanging solder.

soldering—1. The joining of metallic surfaces (e.g., electrical contacts) by melting a metal or an alloy (usually

tin and lead) over them. 2. A process of joining metallic surfaces with solder, without the melting of the base metals. A soldered connection has metallic continuity and therefore excellent long-term reliability. *See* soft soldering; hard soldering.

soldering dross—Usually a combination of tin oxide and lead oxide in a ratio closely resembling the parent metal. In practice this floating mass of tarnish also contains other metal reaction products — sulfides and organic residues such as burned flux, etc. Dross contains the metallic impurities picked up during soldering. This occurs only when the impurity concentrations exceed the solubility limits and when intermetallics are formed that float to the surface.

soldering fluid—A liquid used with wave solder systems that can be intermixed with solder to reduce the surface tension of solder, promote wetting, and eliminate the formation of dross. *See also* soldering oils.

soldering gun—1. A pistol-shaped soldering tool having a trigger switch to turn it on. Operates from 117 volts ac and has an integral stepdown transformer with a single-turn secondary that quickly heats the copper soldering loop. 2. Category of soldering tool. Pistol-grip guns have trigger action control of low or high tip temperatures for general use, with output ranges commonly rated at 100/140, 145/210, or 240/325 watts; temperature-controlled guns designed for solid-state electronics work with interchangeable power heads for varying fixed-tip temperatures.

soldering iron—1. A soldering tool consisting of a heating element to heat the tip and melt the solder, plus a heat-insulated handle. 2. An electrically heated copper-tipped tool that heats the work and melts solder to make a soldered joint.

soldering-iron tip—A high-purity copper-substrate form, iron plated 0.006 to 0.030 inch (0.254 to 1.127 mm) thick, hot tin dipped in the working area, with the remaining surface immunized by nickel-chromium plating. The working area of the tip is usually fabricated for access and maximum heat transfer to the work point.

soldering oils—Liquid compounds formulated for use as the oil in oil intermix wave-soldering equipment and as pot coverings on still solder pots.

solder joint—The point of bonding between solder and component surfaces.

solderless connection—The joining of two metallic parts by pressure only, without soldering, brazing, or using any method that requires heat.

solderless connector—A device for clamping two wires firmly together to provide a good connection without solder. A common form is a cap with tapered internal threads that are twisted over the exposed ends of the wires.

solderless contact—*See* crimp contact.

solderless lug—A terminal lug that holds the conductor it terminates by compressing it under a screw.

solderless terminals—Small metal parts used for joining a wire to another wire or to a stud by the method of crimping.

solderless wrap—Also called wire wrap. A method of connection in which a solid wire is tightly wrapped around a rectangular, square, or V-shaped terminal by means of a special tool.

solderless wrapped connection—Also called wire-wrapped connection or wrapped connection. A connection made by wrapping wire that is under tension around a square or rectangular terminal.

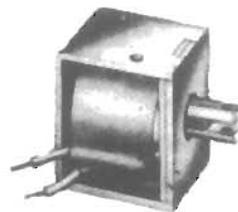
solder lug—Device to which wire is secured by soldering. Solder lugs are attached to a printed circuit board, termination strip, chassis, or electrical component.

solder mask—A printed-circuit-board technique in which everything is coated with a plastic except the contacts to be soldered.

solder short—A defect that occurs when solder forms a short-circuit path between two or more conductors.

solen—In a magnetron or a backward-wave oscillator, an electrode used to carry a current that produces a magnetic field in the desired direction.

solenoid—1. An electric conductor wound as a spiral with a small pitch, or as two or more coaxial spirals. 2. An electromagnet having an energized coil approximately cylindrical in form and an armature whose motion is reciprocating within and along the axis of the coil. 3. A coil of wire surrounding a movable iron bar that is located in such a way that when the coil is energized the core is drawn into it. 4. An electromagnet with a movable steel core (plunger), used to translate electrical energy into linear mechanical motion. The wire coil is wound on a cylindrical or rectangular tube, and the similarly shaped plunger (which may be solid or laminated steel) extends about half way into the tube, in its deenergized position. When the coil is energized by direct current, the plunger is drawn into the tube by magnetic attraction, and the external mechanism connected to the plunger is activated accordingly. Solenoids designed for operation on alternating current are constructed like the dc types, except that the plunger is equipped with the "shading" coil that maintains the magnetic field between alternations of the current, to reduce hum and eliminate chatter. 5. An electromagnet with a movable core, or plunger, which, when it is energized, can move a small mechanical part a short distance. 6. A device that converts electrical energy into mechanical work by providing force only during a linear closing stroke.



Solenoid.

solenoid valve—1. A combination of an electromagnet plunger and an orifice to which a disc or plug can be positioned to either restrict or completely shut off a flow. (Orifice closure or restriction occurs when the electromagnet actuates a magnet plunger.) 2. A combination of two basic functional units: (a) a solenoid (electromagnet) with its plunger (or core), and (b) a valve containing an orifice in which a disc or plug is positioned to stop or allow flow. The valve is opened or closed by movement of the magnetic plunger (or core), which is drawn into the solenoid when the coil is energized.

solid—A state of matter in which the motion of the molecules is restricted. They tend to remain in one position, giving rise to a crystal structure. Unlike a liquid or gas, a solid has a definite shape and volume.

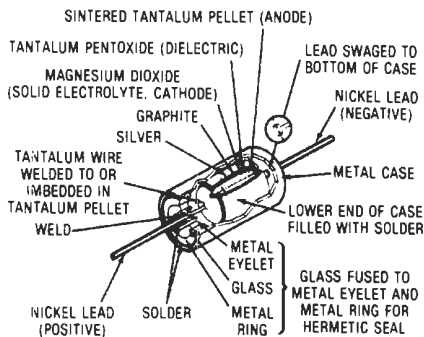
solid circuit—A semiconductor network fabricated in one piece of material by alloying, diffusing, doping, etching, and cutting, and using jumper wires as necessary.

solid conductor—An electrical conductor consisting of a single wire.

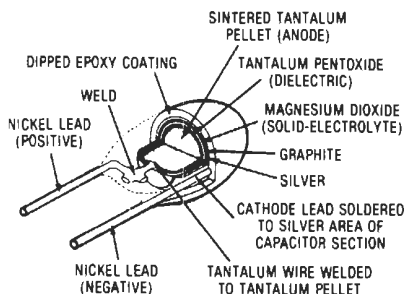
solid electrolyte—A solid semiconductor in direct contact with a thin nonconductive oxide coating.

solid-electrolyte fuel cell—A self-contained fuel cell in which oxygen is the oxidant and hydrogen is the fuel. The oxidant and fuel are kept separated by a solid electrolyte that has a crystalline structure and a low conductivity.

solid-electrolyte tantalum capacitor—Also called solid tantalum capacitor. A tantalum capacitor with a solid semiconductor electrolyte instead of a liquid. A wire anode is used for low capacitance values, and a sintered pellet for higher values.



Hermetically sealed.



Epoxy dipped.

Solid-electrolyte tantalum capacitor.

solid logic technology—The use in computers of miniaturized modules that make possible faster circuitry because of the reduced distances current must travel.

solidly grounded—Also called directly grounded. Grounded through an adequate grounded connection in which no impedance has been inserted intentionally.

solid metal mask—A thin sheet of metal with an etched pattern used in contact printing of film circuits.

solid silicon circuit—Semiconductor circuit that employs a single piece of silicon material in which the various circuit elements (transistors, diodes, resistors, and capacitors) are formed by diffusion in the planar configuration. By combining oxide masking, diffusion, metal deposition, and alloying, a complex network with active and passive components is made completely within a die that is part of a single semiconductor wafer. Often, thin-film devices are applied to the surface of the silicon wafer to provide passive circuit elements beyond the range of solid silicon technology. External

connections are made through small wires soldered, welded, or thermocompression-bonded to selected points of the surface.

solid state—1. Pertaining to circuits and components using semiconductors. 2. The physics of materials in their solid form. Examples of solid-state materials are transistors, diodes, solid-state lasers, metals, and alloys, etc. 3. Technology utilizing solid semiconductors in place of vacuum tubes for amplification, rectification, and switching. 4. A silicon or germanium semiconductor device, such as a diode, transistor, or integrated circuit; or circuits, equipment, or systems made from such devices. 5. A circuit or system that does not rely on vacuum or gas-filled tubes to control or modify voltages and currents. 6. The electronic components that convey or control electrons within solid materials, e.g., transistors, germanium diodes, and integrated circuits. 7. Refers to the electronic properties of crystalline materials, generally semiconductors. As opposed to vacuum and gas-filled tubes that function by flow of electrons through space, or by flow through ionized gases, solid-state devices involve the interaction of light, heat, magnetic field, and electric currents in crystalline materials. Compared with earlier vacuum-tube devices, solid-state components are smaller, less expensive, more reliable, use less power, and generate less heat.

solid-state atomic battery—A device in which a radioactive material and a solar cell are combined. The radioactive material emits particles that enter the solar cell, which in turn produces electrical energy.

solid-state bonding—The process of forming a metallurgical joint between similar or dissimilar metals by causing adjoining atoms at the joint interface to combine by interatomic attraction in the solid state. (This process is different from diffusion bonding in that no atomic diffusion is required.) The adjoining surfaces to be bonded must be atomically clean and must be brought within atomic distances before such a bond can become established.

solid-state circuit—A complete circuit formed from a single block of semiconductor material. *See also* monolithic integrated circuit.

solid-state component—A component whose operation depends on the control of electric or magnetic phenomena in solids (for example, a transistor, crystal diode, or ferrite).

solid-state computer—A computer built primarily from solid-state electronic circuit elements.

solid-state device—1. Any element that can control current without moving parts, heated filaments, or vacuum gaps. All semiconductors are solid-state devices, although not all solid-state devices (for example, transformers) are semiconductors. 2. An electronic device that operates by virtue of the movement of electrons within a solid piece of semiconductor material. 3. Electronic component that controls electron flow through a solid material such as a crystal; for example, a transistor, diode, or integrated circuit.

solid-state imaging system—An imaging system that uses a mosaic of tiny light-sensitive semiconductors (phototransistors) to produce individual outputs that are then converted into a coherent video signal.

solid-state integrated circuits—The class of integrated components in which only solid-state materials are used.

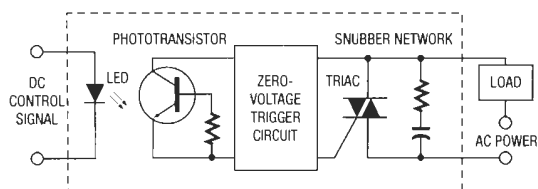
solid-state lamp—1. A pn junction that emits light when forward biased. Made from a complex compound of gallium, arsenic, and phosphorus called gallium arsenide phosphide. Its light output is typically at 670 nanometers. It characteristically looks like a forward-biased diode with a breakdown voltage in the region of 1.6 volts. 2. An

electroluminescent semiconductor that emits low-intensity radiation in the green or red regions. Used as an indicator lamp.

solid-state laser—A laser using a transparent substance (crystalline or glass) as the active medium, doped to provide the energy states necessary for lasing. The pumping mechanism is the radiation from a powerful light source, such as a flash tube. Ruby lasers are solid-state lasers.

solid-state physics—The branch of physics that deals with the structure and properties of solids, including semiconductors (i.e., a material whose electric resistivity is between that of insulators and conductors). Generally used semiconductors are silicon and germanium.

solid-state relay—Abbreviated SSR. 1. A relay that employs solid-state semiconductor devices as components. 2. A factory-built and packaged product used for switching an ac load. It has an isolated input/output construction that permits the current to be switched electronically without moving parts. Optical and transformer coupling are among the methods used to achieve input/output isolation and permit coupling from the control circuit to the trigger circuit. SSRs are used in place of electromechanical relays when there is a need for compatibility with digital logic drive circuits, where an electromagnetic coil and contacts would cause interference problems. 3. An on/off control device in which the load current is conducted by one or more semiconductors, e.g., a power transistor, SCR, or triac.



Solid-state relay.

solid-state switch—A no-contact switch that completes a circuit by means of solid-state components.

solid-state watch—A timepiece that uses a quartz crystal or other precise frequency resonator in conjunction with low-power MOS integrated circuits. Employs liquid crystals or light-emitting diodes to indicate hours, minutes, seconds, data, months, days of the week, etc., in a digital and/or alphanumeric format.

solid tantalum capacitor—See solid-electrolyte tantalum capacitor.

solidus—The highest temperature at which a metal or alloy is completely solid.

solid wire—Wire that consists of a single conductor, not of multiple strands.

solion—Contraction of solution ion. An electrochemical sensing and control device in which ions in solution carry electric charges to give amplification corresponding to that of vacuum tubes and transistors.

solion integrator—A precision electrochemical cell housed in glass and containing four small platinum electrodes in a solution of potassium iodide and iodine. The integrator anode and cathode make up the covers of a small cylindrical volume (less than 0.00025 in.³, or 0.0041 cm³) for storing electrical information in the form of ions. The integrator cathode contains a fixed amount of hydraulic porosity for completing the internal-solution path to the other two electrodes.

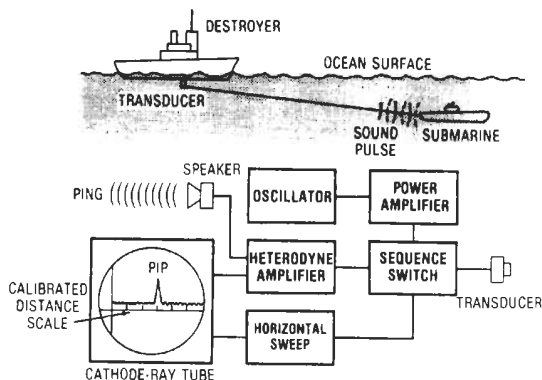
solo manual—See swell manual.

Sommerfeld formula—An approximate wave-propagation relationship that may be used when distances are short enough that the curvature of the earth may be neglected in the computations.

Sommerfeld's equation—Equation for ground-wave propagation that relates field strength at the surface of the earth at any distance from a transmitting antenna to the field strength at unit distance for given ground losses.

Sonalert—A solid-state tone-emitting device (P. R. Mallory & Co., Inc.).

sonar—Acronym for sound navigation and ranging. Also called active sonar if it radiates underwater acoustic energy, or passive (listening) sonar if it merely receives the energy generated from a distant source. 1. Apparatus or technique of obtaining information regarding underwater objects or events through the transmission and reception of acoustic energy. Two well-known uses are to detect submarines and fish. 2. A system that uses underwater sound, at sonic or ultrasonic frequencies, to detect and locate objects in the sea. Sonar signals can also be used as a communication medium. The various systems generally may be divided into three basic classifications: passive (listening only), echo-ranging (active), and communication.



Sonar.

sonar background noise—In sonar, the total noise presented to the final receiving element that interferes with the reception of the desired signal.

sone—1. A unit of loudness. A simple tone of frequency 1000 hertz, 40 dB above a listener's threshold, produces a loudness of 1 sone. The loudness of any sound that is judged by the listener to be n times that of the 1-sone tone is n sones. 2. A value for loudness. May be used for overall evaluation of a sound or of a frequency band. The sone scale is linear (in contrast to decibels, which are logarithmic).

sones per bark—Loudness density defined as a function of subjective pitch. When loudness density is integrated over subjective pitch, the result is total loudness.

sonic—1. Pertaining to the speed of sound. 2. Utilizing sound waves.

sonic altimeter—An altimeter that determines the height of an aircraft above the earth by measuring the time the sound waves take to travel from the aircraft to the ground and back, based on the fact that the velocity of sound at sea level is 1080 feet per second (329 m/s) through dry air at 0°C (32°F).

sonic applicator—A self-contained electromechanical transducer for local application of sound for therapeutic purposes.

sonic cleaning—The cleaning of contaminated materials by the action of intense sound waves produced in the liquid into which the material is immersed.

sonic delay line—A device in which electroacoustic transducers and the propagation of an elastic wave through a medium are used to produce the delay of an electrical signal.

sonic drilling—The cutting or shaping of materials with an abrasive slurry driven by a reciprocating tool attached to an electromechanical transducer.

sonic frequencies—Vibrations that can be heard by the human ear (from about 15 hertz to approximately 20,000 hertz).

sonic motion detector—A sensor that detects the motion of an intruder by his or her disturbance of an audible sound pattern generated within the protected area.

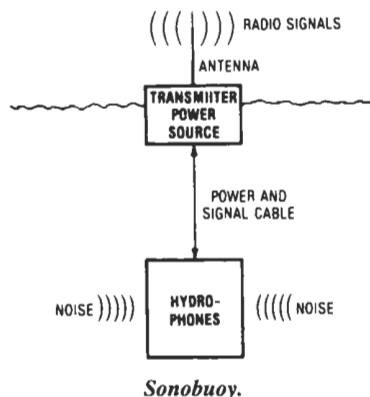
sonic soldering—The method of joining metals by the use of mechanical vibration to break up the surface oxides.

sonic speed—See speed of sound.

sonic thermocouple—A thermocouple so designed that gas moves past the junction with a velocity of mach 1 or greater, resulting in maximum heat transfer to the junction.

sonne—Also called *consol*. A radionavigational aid that provides a number of rotating characteristic signal zones. A bearing may be determined by observation (and interpolation) of the instant when transition occurs from one zone to the following zone.

sonobuoy—Also called a *radiosonobuoy*. 1. A device used to locate a submerged target (e.g., a submarine). By means of a hydrophone system in the water, a sonobuoy detects the noises and converts them into radio signals, which are transmitted to a receiver in an airplane. Each sonobuoy transmits on one of several possible frequencies, and the receiver in the airplane has a channel selector so the operator can switch from one to another. 2. A passive sonar device (to distinguish it from an active sonar system, which transmits a signal and listens for an echo) that uses hydrophones to convert acoustic signals from natural phenomena, such as wave motion, or from ships or submarines into electrical signals. These signals are filtered and sent to the surface for transmission to a surface vessel or aircraft for further processing.



sonoluminescence—1. The creation of light in liquids by sonically induced cavitation. 2. The luminescence

of a substance resulting from its exposure to ultrasonic waves.

sonometer—A frequency meter whose operation depends on its mechanical resonance with the vibrations of a variable length of stretched wire.

sonoptography—The use of sound waves to obtain a 3D image of an object. No lenses are required. In essence, a two-stage process in which the diffraction pattern of an object irradiated by sound waves is biased by a coherent sound wave and recorded. The resultant pattern, like the hologram, then is interrogated with a suitable coherent light source to obtain a three-dimensional image.

sonoradiography—The diagnostic procedure that uses ultrasonic energy to probe the body and, with the help of laser beams, a reflecting membrane to produce a three-dimensional picture.

sophisticated—A piece of equipment, system, etc., that is complex and intricate, or requires special skills to operate.

sophisticated vocabulary—An advanced and elaborate set of computer instructions, enabling the computer to perform such intricate operations as linearizing, extracting square roots, selecting the highest number, etc.

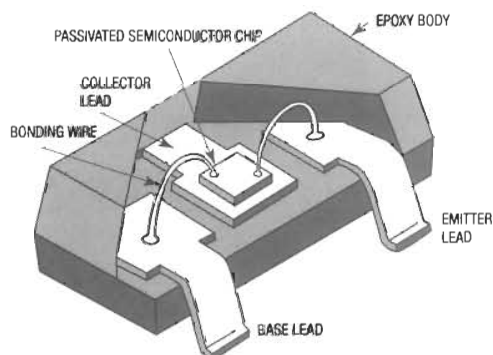
sorption—The combination of absorptive and adsorptive processes in the same material.

sort—1. To arrange items of information according to rules that depend on a key or field contained by the items. 2. A function performed by a program, usually part of a utility package; items in a data file are arranged or rearranged in a logical sequence designated by a keyword or field in each item in the file. 3. A procedure designed to arrange a group of elements in random order into some kind of a sequence. Examples include the bubble sort, the selection sort, and the partition sort. 4. The process of arranging data in a specific order.

sorter—A machine that sorts cards according to the position of coded holes.

SOS—1. A distress signal used in radiotelegraphy. 2. Abbreviation for silicon on sapphire. A CMOS technology in which a layer of silicon is epitaxially grown on a sapphire wafer, with specific regions subsequently etched away between individual transistors. Each device is thus totally isolated from other devices. Since sapphire is an insulator, SOS is a subset of SOI (silicon-on-insulator) technology. Both SOI and SOS technologies provide for high levels of radiation hardness.

SOT—Abbreviation for small outline transistor. A small plastic package with gull wing leads for mounting discrete semiconductor devices on printed circuit boards.



SOT—small outline transistor (SOT 23 size).

sound—1. Also called a sound wave. An alteration in pressure, stress, particle displacement or velocity, etc., propagated in an elastic material, or the superposition of such propagated alterations. 2. Also called a sound sensation. The auditory sensation usually evoked by the alterations described in (1) above. 3. An undulatory motion of air or other elastic medium, which can produce the sensation of hearing when incident on the ear. (Sound requires a medium for propagation, for unlike electromagnetic waves, sound cannot travel through a vacuum.)

sound absorption—The conversion of sound energy into some other form (usually heat) in passing through a medium or on striking a surface.

sound-absorption coefficient—The incident sound energy absorbed by a surface or medium, expressed in the form of a fraction.

sound analyzer—A device for measuring the amplitude and frequency of the components of a complex sound. It usually consists of a microphone, an amplifier, and a wave analyzer.

sound articulation—The percent of articulation obtained when the speech units are fundamental sounds (usually combined into meaningless syllables).

sound bars—Alternate dark and light horizontal bars caused in a television picture by audio-frequency voltage reaching the video-input circuit of the picture tube.

sound board—A hardware adapter that dramatically adds digital sound reproductions capabilities to IBM-compatible computers.

sound carrier—The frequency-modulated carrier that transmits the sound portion of television programs.

sound concentrator—A parabolic reflector used with a microphone at its focus to obtain a highly directive pickup response.

sound-effect filter—A filter, usually adjustable, designed to reduce the passband of a system at low and/or high frequencies in order to produce special effects.

sound energy—The total energy in a given part of a medium, minus the energy that would exist there if no sound waves were present.

sound-energy density—At a point in a sound field, the sound energy contained in a given infinitesimal part of the medium, divided by the volume there. The commonly used unit is the erg per cubic centimeter.

sound-energy flux—The average rate at which sound energy flows through any specified area for a given period. The commonly used unit is the erg per second.

sound-energy flux density—See sound intensity.

sounder—See telegraph sounder.

sound field—A region in any medium containing sound waves.

sound film—Motion-picture film having a sound track along one side of the picture frames for simultaneous reproduction of the sounds that accompany the film. A beam of light is projected through the sound track and is modulated at an audio rate by the variations in the width or density of the track. A phototube and amplifier then convert these modulations into sound.

sound gate—A mechanical device through which film is passed in a projector to convert the sound track into audio signals that can be amplified and reproduced. In a television camera used for pickups, a sound gate provides the sound accompaniment for the motion picture being televised. Associated with the sound gate are an exciter lamp, a lens assembly, and a phototube.

sound head—The part of a sound motion-picture projector that converts the photographic or magnetic sound track on the film into audible sound signals.

sounding—Determination of the depth of water or the altitude above the earth.

sound intensity—Also called specific sound-energy flux or sound-energy flux density. The average rate of sound energy transmitted in a specified direction through a unit area normal to this direction at the point considered. The common unit is the erg per second per square centimeter, although sound intensity expressed in watts per square centimeter may occasionally be used.

sound intensity level—The amount of sound power passing through a unit area.

sound level—A measure of the overall loudness of sounds on the basis of approximations of equal loudness of pure tones. It is expressed in decibels with respect to 0.0002 microbar.

sound-level meter—An instrument—including a microphone, amplifier, output meter, and frequency-weighting networks—for the measurement of noise and sound levels. The measurements approximate the loudness level obtained for pure tones by the more elaborate ear-balance method.

sound-on-sound recording—1. A method by which material previously recorded on one track of a tape may be recorded on another track while simultaneously adding new material to it. 2. A method of tape recording in which an original sound track may be impressed with an added sound track for special effects, such as one performer appearing to play two instruments, etc.

sound-powered telephone set—1. A telephone set in which the transmitter and receiver are passive transducers; operating power is obtained from the speech input only. The voice sound waves operate a moving coil or variable-reluctance transmitter to produce the current waves transmitted to the telephone line. No external power is used, but the output level is lower than that of a battery-powered phone. 2. A telephone set whose transmitter is a dynamic microphone. It requires no power other than that of the voice of the user.

sound-power level—1. The ratio, expressed in decibels, of the sound power emitted by a source to a standard reference power of 10^{-13} watt. 2. The number of watts of acoustic power radiated by a noise source.

sound power of a source—The total sound energy radiated by the source per unit of time. The common unit is the erg per second, but the power may also be expressed in watts.

sound pressure—The instantaneous pressure minus the static pressure at some point in a medium when a sound wave is present.

sound-pressure level—Abbreviated SPL. 1. In decibels, 20 times the logarithm of the ratio of the pressure of a sound to the reference pressure, which must be explicitly stated (usually, either $20 \mu\text{Pa}$, 2×10^{-4} microbar, or 1 microbar). 2. The pressure of an acoustic wave stated in terms of newtons/square meter, dynes/square centimeter, or microbars. (One microbar is approximately equal to one millionth of the standard atmospheric pressure.)

sound probe—A small microphone (or tube added to a conventional microphone) for exploring a sound field without significantly disturbing it.

sound recordings—Records, tapes, or other sonic components upon which audio intelligence is inscribed or recorded or can be reproduced.

sound-recording system—A combination of transducing devices and associated equipment for storing sound in a reproducible form.

sound-reflection coefficient—Also called acoustical reflectivity. Ratio at which the sound energy reflected from a surface flows on the side of incidence to the incident rate of flow.

sound-reproducing system—A combination of transducers and associated equipment for reproducing prerecorded sound.

sound sensation—See sound, 2.

sound-sensing detection system—An alarm system that detects the audible sound caused by an attempted forcible entry into a protected structure. The system consists of microphones and a control unit containing an amplifier, accumulator, and a power supply. The unit's sensitivity is adjustable so that ambient noises or normal sounds will not initiate an alarm signal. However, noises above this preset level or a sufficient accumulation of impulses will initiate an alarm.

sound sensor—A sensor that responds to sound; a microphone.

sound spectrum—The frequency components included within the range of audible sound.

sound stage—The area between the two or more speakers of a stereo or quad setup where subjective sound images or imaginary speakers seem to be, providing a wide area of apparent sound source.

sound takeoff—The connection or coupling at which the 4.5-MHz frequency-modulated sound signal in a television receiver is obtained.

sound track—The narrow band that carries the sound in a movie film. It is usually along the margin of the film, and more than one band may be used (e.g., for stereophonic sound).

sound-transmission coefficient (of an interface or septum)—Also called acoustical transmittivity. The ratio of the transmitted to the incident sound energy. Its value is a function of the angle of incidence of the sound.

sound wave—See sound, 1.

sound-with-sound—1. A special provision in some recorders that allows the record head for one channel to be used for listening to that track while adding new material in exact synchronism on the adjacent track. Playing and mixing both simultaneously produces a composite sound without the degradation of one sound otherwise caused by a dubbing step in sound-on-sound mixing. 2. A process by which a program is recorded on one track, then monitored as a second program is recorded on another track.

source—1. The device that supplies signal power to a transducer. 2. In a field-effect transistor, the electrode that corresponds to the cathode of a vacuum tube. 3. Supply of energy, or device upstream from a sink. See also sink. 4. Terminal that usually sources carriers. In MOS devices, which are usually symmetrical, it can be interchanged with the drain terminal in a circuit. 5. The working-current terminal (at one end of the channel in a FET) that is the source of holes (p-channel) or free electrons (n-channel) flowing in the channel. Corresponds to the emitter in a bipolar transistor. 6. The device that switches positive dc to a load. The current flows from the sensor into the load. 7. The origin of radiant energy, such as a light-emitting diode. 8. User-written instruction statements prior to translation by a computer into machine-executable form. 9. One of the three regions that form a field-effect transistor. Majority-carriers (electrons in an n-channel FET or holes in a p-channel FET) originate at the source and flow across the channel to the drain as a result of the electric field applied between source and drain.

source address—In computer systems having a source-destination architecture, the source address is the address of the device address or memory location from which data is being transferred.

source code—1. A nonexecutable computer program written in a high-level language. A compiler or

sound-reproducing system — source recording

assembler must translate the source code into object code (machine language) that the computer can understand and process. 2. Virtually any computer language, from assembly to high-level, that doesn't fit the definition of object code.

source connector—One of three classifications of fiber-optic connectors that interconnect a light source (typically a LED) to a fiber-optic cable. A metal connector shell that is mounted on a circuit board or attached to a panel provides heat sinking and EMI protection. See bundle connector.

source-cutoff current—The current into the source terminal of a depletion-type transistor with a specified gate-to-drain voltage applied to bias the device to the off state.

source data automation—The methods of recording information in coded forms on paper tapes, punched cards, or tags that can be used repeatedly to produce many other records without rewriting.

source document—A paper containing information that is to be read into the computer.

source electrode—One of the electrodes in a field-effect transistor. It is analogous to the emitter in a transistor or the cathode in a vacuum tube. Represented by the symbol S.

source impedance—1. The impedance that a source of energy presents to the input terminals of a device. 2. The impedance that a meter or other instrument sees; i.e., the impedance of the driving circuit when measured from the input terminals of the meter.

sourcing—Redesign or modification of existing equipment to eliminate a source of electromagnetic interference. When sourcing is not feasible, engineers are forced to resort to suppression, filtering, or shielding.

source language—1. The language used to prepare a problem as the input for a computer operation. 2. In a computer, the language from which a statement is translated. 3. The original language used by the programmer, on which a translator program operates. 4. In general, any language that is to be translated into another (target) language; usually, however, it refers to the language used by a programmer to program a system.

source load—A load with a current whose direction is toward its input. A source load must be driven by a current source.

source machine—The computer used to translate the source program into the object program.

source module—In a computer, a series of statements expressed in the symbolic language of an assembler or compiler and constituting the entire input to a single execution of the assembler or compiler.

source program—1. A computer program written in a language designed for ease of expression of a class of problems or procedures by humans. A generator, assembler, translator, or compiler routine translates the source program into an object program in machine language. 2. The original program, as written by the programmer, from which a working program system is derived. 3. A program, in either hard-copy or stored form, written in a high-level language (source language) other than machine language, which requires translation by the assembler, compiler, or interpreter program before it can be run on the computer. 4. A program written by a human, either in assembly or in a high-level language.

source recording—The recording of information in machine-readable form, such as punched cards or tape, magnetic tape, etc. Once in this form, the information may be transmitted, processed, or reused without a need for manual processing.

source statement—A computer program written in other than machine language, usually in three-letter mnemonic symbols that suggest the definition of the instruction. There are two kinds of source statements: executive instructions, which translate into operating machine code (op code), and assembly directives, which are useful in documenting the source program but generate no code.

source/tape switch—A control found on control amplifiers with tape monitor jacks, and on recorders with monitor heads; allows comparison of the signal being fed to the tape (source) with the signal just recorded.

source terminal—The terminal electrically connected to the region from which majority carriers flow into the channel of a field-effect transistor.

south pole—In a magnet, the pole into which magnetic lines of force are assumed to enter after emerging from the north pole.

space—1. An impulse that, in a neutral circuit, causes the loop to open or causes the absence of a signal, whereas in a polar circuit it causes the loop current to flow in a direction opposite to that for a mark impulse. A space impulse is equivalent to a binary 0. 2. In some codes, a character that causes a printer to leave a character width with no printed symbol. 3. The signaling state used to represent a binary 0. *See* mark. 4. One of two states describing the condition of a teleprinter's loop. The space is characterized by an open-loop condition. The mark state indicates a closed loop.

space attenuation—1. The loss of energy, expressed in decibels, of a signal in free air caused by such factors as absorption, reflection, scattering, and dispersion. 2. Reduction of a TV satellite signal strength due to the fact that the beam spreads out after leaving the antenna. It is a major factor in path loss.

space charge—1. The negative charge caused by the cloud of electrons that forms in the space between the cathode and plate of a vacuum tube because the cathode emits more electrons than are attracted immediately to the plate. 2. An electrical charge distributed throughout a volume or space.

space-charge debunching—In a microwave tube, a process in which the bunched electrons are dispersed due to the mutual interactions between electrons in the stream.

space-charge effect—Repulsion of electrons emitted from the cathode of a thermionic vacuum tube by electrons accumulated in the space charge near the cathode.

space-charge field—The electric field that occurs inside a plasma due to the net space charge in the volume of the plasma.

space-charge grid—A grid, usually positive, that controls the position, area, and magnitude of a potential minimum or of a virtual cathode adjacent to the grid.

space-charge region—The region around a pn junction in which holes and electrons recombine, leaving no mobile charge carriers and a net charge density different from zero. *See also* depletion layer.

space-charge tube—A tube in which the space charge is used to greatly increase the transconductance. A positively charged grid is placed next to the cathode, in front of the control grid. This enlarges the space charge, moving it out to where the control grid can have a greater effect on it and hence on the plate current.

space coordinates—A three-dimensional system of rectangular coordinates. The x and y coordinates lie in a reference plane tangent to the earth, and the z coordinate is perpendicular.

space current—The total current between the cathode and all other electrodes in a vacuum tube.

spaced antenna—An antenna system used for minimizing local effects of fading at shortwave receiving stations. So called because it consists of several antennas spaced a considerable distance apart.

spaced-antenna direction finder—A direction finder comprising two or more similar but separate antennas coupled to a common receiver.

space detection and tracking system—A system that can detect and track space vehicles from the earth and report the orbital characteristics of such vehicles to a central control facility.

space diversity—*See* space diversity reception.

space diversity gain—The improvement in radio reception, expressed in decibels, obtained by combining the signals from two receiving antennas physically separated by not less than 5 wavelengths.

space diversity reception—Also called space diversity. 1. Diversity reception from receiving antennas placed in different locations. 2. A method of diversity radio reception in which the receiving antennas are physically separated, vertically or horizontally, by 5 wavelengths or more.

spaced-loop direction finder—A spaced-antenna direction finder in which the individual antennas are loops.

space factor—Ratio of the effective area utilized to the total area in a winding section.

space harmonics—Harmonics in the distribution of flux in the air gap of a resolver. They may be determined as a percent of fundamental by a Fourier analysis of the flux distribution antenna. Space harmonics cause angular inaccuracy.

space-hold—In a computer, the normal no-traffic line condition by which a steady space is transmitted.

space pattern—On a test chart, a pattern designed for the measurement of geometric distortion. The EIA ball chart is an example.

space permeability—The factor that expresses the ratio of magnetic induction to magnetizing force in a vacuum. In the cgs electromagnetic system of units, the permeability of a vacuum is arbitrarily taken as unity.

space phase—Reaching corresponding peak values at the same point in space.

space quadrature—The difference in the position of corresponding points of a wave in space, the points being separated by one-quarter of the wavelength in question.

space radio station—An amateur radio station located on an object that is beyond, is intended to go beyond, or has been beyond the major portion of the earth's atmosphere.

spacer cable—A means of primary power distribution that consists of three partially insulated or covered phase wires and a high-strength messenger-ground wire, all mounted in plastic or ceramic insulating spacers.

space-to-mark transition—The transition, or switching, from a spacing impulse to a marking impulse. (Teletypewriter term.)

space wave—The radiated energy consisting of the direct and ground waves.

spacing—The distance between stereo microphones or speakers.

spacing end distortion—End distortion that lengthens the spacing impulse by advancing the mark-to-space transition. (Teletypewriter term.)

spacing interval—The interval between successive telegraph signal pulses. During this interval, either no current flows or the current has the opposite polarity from that of the signal pulses.

spacing pulse—In teletypewriter operation, the signal interval during which the selector unit does not operate.

spacing wave—Also called back wave. In telegraphic communication, the emission that takes place between the active portion of the code characters or while no code characters are being transmitted.

spacistor—1. A semiconductor device consisting of one pn junction and four electrode connections. It is characterized by a low transient time for carriers to flow from the input to the output. 2. Multiple-terminal solid-state device, similar to a transistor, that achieves high-frequency operation up to about 10,000 MHz by injecting electrons or holes into a space-charge layer that rapidly forces these carriers to a collecting electrode.

spade connector—A terminal with a slotted tongue and nearly square sides.

spade contact—A contact with fork-shaped female members designed to dovetail with spade-shaped male members. Alignment in this type of connection is very critical if good conductivity is to be achieved.

spade lug—A solder lug that has an open end so that it can be slipped under the head of a binding screw.

spade tips—Notched, flat metal strips connected to the end of a cord or wire so that it can be fastened under a binding screw.

spade-tongue terminal—A slotted-tongue terminal designed to be slipped around a screw or stud without removal of the nut.

spaghetti—1. Heavily varnished cloth tubing sometimes used to provide insulation for circuit wiring. 2. A form of tubular insulation that can be slipped over wires before they are connected to terminals.

span—1. The part or space between two consecutive points of support in a conductor, cable, suspension strand, or pole line. 2. The reach or spread between two established limits, such as the difference between high and low values in a given range of physical measurements.

span adjustment—See sensitivity adjustment.

s-parameters—Abbreviation for scattering parameters. A group of measurements taken at different frequencies that represent the forward and reverse gain and the input and output reflection coefficients of a microwave component when the input and output ports of the component are terminated in specified impedances—usually 50 ohms.

spark—1. The abrupt, brilliant phenomenon that characterizes a disruptive discharge. 2. A single, short electrical discharge between two electrodes. 3. The brief flash of light from the arc. 4. The bridging or jumping of a gap between two electrodes by a current of electricity.

spark capacitor—A capacitor connected across a pair of contact points, or across the inductance that causes the spark, for the purpose of diminishing sparking at these points.

spark coil—An induction coil used to produce spark discharges.

spark duration—1. The time between the moment when the electrons first jump a gap and the moment when the current ceases to flow across it. 2. The length of time a spark is established across a spark gap or the length of time current flows in a spark gap.

spark electrodes—The conductive element on each side of a spark gap through which current flows to and from the gap.

spark energy—The amount of energy dissipated between the electrodes of a spark gap. This is normally expressed as a steady-state wattage as though dissipated for a full second. Normally expressed in milliwatt seconds or millijoules.

spark frequency—The total number of sparks occurring per second in a spark transmitter (not the frequency of the individual waves).

spark gap—The arrangement of two electrodes between which a disruptive discharge of electricity may occur, and such that the insulation is self-restoring after the passage of a discharge.

spark-gap modulation—Modulation in which a controlled spark-gap breakdown produces one or more pulses of energy for application to the element in which the modulation is to take place.

spark-gap modulator—A modulator employed in certain radar transmitters. A pulse-forming line is discharged across either a stationary or a rotary spark gap.

spark-gap oscillator—A type of oscillator consisting essentially of an interrupted high-voltage discharge and a resonant circuit.

sparking—Intentional or accidental spark discharge, as between the brushes and commutator of a rotating machine, between the contacts of a relay or switch in a solid tantalum capacitor, or at any other point, in which a circuit is broken.

sparking voltage—The minimum voltage at which a spark discharge occurs between electrodes of a given shape at a given distance apart under given conditions.

spark killer—Also called spark suppressor. An electric network, usually a capacitor and resistor in series, connected across a pair of contact points (or across the inductance that causes the spark) to diminish sparking at these points.

spark lag—The interval between attainment of the sparking voltage and passage of the spark.

sparklies—Also known as snow. 1. Weak-signal noise that appears as dot or streak interference in a satellite TV picture. Loss of lock in an FM video demodulator causes this. In extreme cases, tearing or loss of the picture may result. 2. Small black and/or white blips or dots in a television picture, indicating an insufficient signal-to-noise ratio.

sparkover—Breakdown of the air between two electrical conductors, permitting the passage of a spark.

spark plate—In an automobile radio, a metal plate insulated from the chassis by a thin sheet of mica. It bypasses the noise signals picked up by the wiring under the hood.

spark plug—An assembly that includes a pair of electrodes and insulator. It provides a spark gap in an engine cylinder.

spark-quenching device—See spark suppressor.

spark recorder—A recorder in which the recording paper passes through a spark gap formed by a metal plate underneath and a moving metal pointer above the paper. Sparks from an induction coil pass through the paper, periodically burning small holes that form the record trace.

spark source—A device used to produce a short-circuit pulse of luminous energy by an electrical discharge between two closely spaced electrodes either in air or in a controlled atmosphere at a pressure usually greater than half an atmosphere.

spark spectrum—The spectrum produced in a substance when the light from a spark passes between terminals made of that substance or through an atmosphere of that substance.

spark suppression—The use of a capacitor or resistor across contacts that break currents in inductive circuits, to prevent excessive sparking when the contacts break. A capacitor and resistor in series may also be used.

spark suppressor—Also called a spark-quenching device, spark killer, or an arc suppressor. An electric network, such as a capacitance and resistance in series or

a diode connected across a pair of contacts, to diminish sparking (arcing) at these contacts.

spark test—A test performed on wire and cable to determine the amount of detrimental porosity or defects in the insulation.

spark transmitter—A radio transmitter in which the source of radio-frequency power is the oscillatory discharge of a capacitor through an inductor and a spark gap.

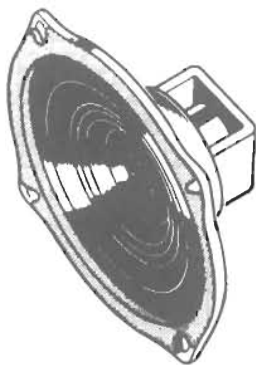
spatial coherence—The phase relationship of two wave trains in space.

spatial distribution—The directional properties of a speaker, transmitting antenna, or other radiator.

spatial frequency—The number of black and white line pairs displayed on a screen per degree of visual angle. Spatial frequency is expressed as cycles per degree or as lines per inch for a given viewing distance.

SPDT—Abbreviation for single-pole, double-throw. A three-contact switching arrangement that connects a circuit to one of two alternate connections.

speaker—Abbreviated spkr. Also called a loud-speaker. An electroacoustic transducer that radiates acoustic power into the air with essentially the same waveform as that of the electrical input.



Speaker.

speaker efficiency—Ratio of the total useful sound radiated from a speaker at any frequency to the electrical power applied to the voice coil.

speaker impedance—The rated impedance of the voice coil of a speaker.

speaker-reversal switch—A switch for connecting the left channel to the right speaker and vice versa on a stereo amplifier. It is a means of correcting for improper left-right orientation in the program source.

speaker system—A combination of one or more speakers and all associated baffles, horns, and dividing networks used to couple the driving electric circuit and the acoustic medium together.

speaker voice coil—In a moving-coil speaker, the part that is moved back and forth by electric impulses and is fastened to the cone in order to produce sound waves.

speaking arc—A dc arc on which audio-frequency currents have been superimposed. As a result, the arc reproduces sounds in a manner similar to a speaker, and its light output will vary at the audio rate required for sound-film recording.

special-effects generator—An apparatus used in the production of videotapes, this unit makes possible smooth switching of camera inputs and provides a wide variety of screen techniques, such as split and wipes.

special-event station—Station licensed at a specific land location for operation related to the celebration of an event, past or present, that is unique, distinct, and of general interest to either the public or to amateur radio operators, for the purpose of bringing public notice to the amateur radio service.

special-function key—A key on a keyboard that often has no predefined purpose but that can be programmed to send one or more useful commands.

special-purpose computer—A computer designed to solve a restricted class of problems, as contrasted with a general-purpose computer.

special-purpose language—A programming language that is designed to satisfy a single specific objective.

special-purpose logic—Proprietary features of a programmable controller that allow it to perform logic not normally found in relay ladder logic.

special-purpose motor—A motor possessing special operating characteristics and/or special mechanical construction designed for a particular application and not included in the definition of a general-purpose motor.

special-purpose relay—A relay whose application requires special features not characteristic of general-purpose or definite-purpose relays.

specific acoustic impedance—Also called unit-area acoustic impedance. The complex ratio of sound pressure to particle velocity at a point in a medium.

specific acoustic reactance—The imaginary component of the specific acoustic impedance.

specific acoustic resistance—The real component of the specific acoustic impedance.

specifications—1. A published set of instructions for doing work in a uniform, standard manner. 2. Detailed description of the characteristics of a component, device, or system. 3. A clear, complete, and accurate statement of the technical requirements descriptive of a material, an item, or a service, and of the procedure to be followed to determine if the requirements are met.

specific coding—Digital-computer coding in which all addresses refer to specific registers and locations.

specific conductance—*See* electrolytic conduction.

specific conductivity—The conducting ability of a material in mhos per cubic centimeter. It is the reciprocal of resistivity.

specific damping of an instrument—*See* relative damping of an instrument.

specific dielectric strength—The dielectric strength per millimeter of thickness of an insulating material.

specific gravity—The weight of a substance compared with the weight of the same volume of water at the same temperature.

specific heat—1. The capacity of a material to be heated at a given temperature (expressed as calories per degree Celsius per gram) compared with water, which has a specific heat of 1. 2. The amount of heat required to raise a specified mass by one unit of a specified temperature.

specific inductive capacity—*See* dielectric constant.

specific magnetic moment—The saturation moment of a magnetic material per unit weight. It is expressed in terms of emu/gram.

specific program—Digital-computer programming for solving a specific problem.

specific repetition rate—In loran, one of a set of closely spaced repetition rates derived from the basic rate and associated with a specific set of synchronized stations.

specific resistance—The resistance of a conductor. It is expressed in ohms per unit length per unit area, usually circular mil feet. *See also* resistivity, 1.

specific routine—A digital-computer routine expressed in specific computer coding and used to solve a specific mathematical, logical, or data-handling problem.

specific sound-energy flux—*See* sound intensity.

spectral—1. Being a function of wavelengths. 2. Pertaining to or as a function of wavelength. Spectral quantities are evaluated at a single wavelength.

spectral bandwidth—The difference between the wavelengths of single-peak devices at which the radiant intensity is 50 percent (unless otherwise stated) of the maximum value.

spectral characteristic—1. The relationship between the radiant sensitivity of a phototube and the wavelength of the incident radiant flux. It is usually shown by a graph. 2. The relation, usually shown by a graph, between the emitted radiant power per wavelength interval and the wavelength.

spectral coherence—A measure of the extent to which the output of a photodetector is restricted to a single wavelength or band of wavelengths; color response.

spectral contour plotter—A spectrum analyzer that presents a three-dimensional contour plot of analog signals, heart sounds, brain waves, etc.

spectral density—A value of a function whose integral over a frequency interval represents the contributions of the signal components within that frequency interval.

spectral energy distribution—Abbreviated SED. A plot of energy as a function of wavelength for a given light.

spectral intensity—A function that precisely defines the spectrum and has the units of voltage squared per unit frequency.

spectral output (of a light-emitting diode)—A description of the radiant-energy or light-emission characteristic versus wavelength. This information is usually given by stating the wavelength at peak emission and the bandwidth between half-power points or by means of a curve.

spectral purity—A measure of how much the spectrum of the output of a signal generator deviates from that of a pure sine wave.

spectral radiant flux—The radiant flux per unit wavelength interval, usually in watts per nanometer.

spectral radiant reflectance—That fraction of the power in a light beam that is reflected from a surface. In less precise usage, called reflectivity.

spectral response—Also called *spectral sensitivity* characteristic. 1. The relative amount of visual sensation produced by one unit of radiant flux of any one wavelength. The human eye or a photocell exhibits greatest spectral response to the wavelengths producing yellow-green light. 2. The variation of responsivity of the detector with the wavelength of the impinging radiation.

spectral sensitivity—The color response of a photosensitive device.

spectral sensitivity characteristic—*See* spectral response

spectral voltage density—The rms voltage corresponding to the energy contained in a frequency band having a width of 1 hertz. For the spectral voltage density at a given frequency, the band is centered on the given frequency.

spectrogram—A machine-made graphic representation of sounds in terms of their component frequencies. Time is shown on the horizontal axis, frequency on the vertical axis, and intensity by the darkness of the mark.

spectrograph—An instrument with an entrance slit and dispersing device that uses photography to obtain a record of the spectral range. The radiant power passing through the optical system is integrated over time, and the quantity recorded is a function of the radiant energy.

spectrometer—A test instrument that determines the frequency distribution of the energy generated by any source and displays all components simultaneously.

spectrophotoelectric—1. Pertaining to the dependence of photoelectric phenomena on the wavelength of the incident radiation. 2. Characteristic of the relationship between photoelectric activity and the wavelength of incident radiation.

spectrophotometer—An instrument for measuring spectral transmittance or reflectance.

spectrophotometric analysis—The detection and measurement, relative to wavelength, of spectral reflectance, spectral transmittance, or spectral emittance.

spectrophotometry—1. A process of making comparisons between parts of light spectra by means of a photometric device in combination with a spectrometer. 2. Study of the reflection or transmission properties of specimens as a function of wavelength.

spectroradiometer—An instrument for measuring the radiant energy from a source at each wavelength through the spectrum. Spectral regions are separated either by calibrated filters or by a calibrated monochromator. The detector is usually an energy receiver, such as a thermocouple.

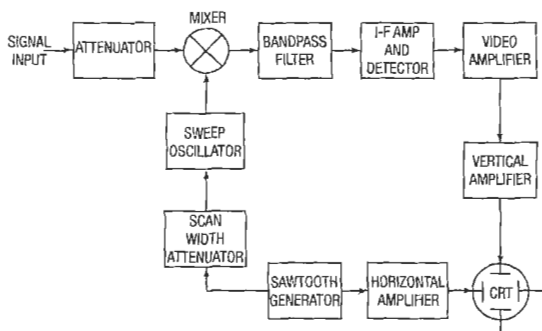
spectroscope—An instrument used to disperse radiation into its component wavelengths and to observe or measure the resultant spectrum.

spectroscopy—1. The branch of optics that deals with radiations in the infrared, visible, and ultraviolet regions of the spectrum. 2. The measurement and interpretation of the electromagnetic radiation absorbed or emitted when molecules, atoms, or ions change from one internal energy level to another. Such a change could be caused by incident radiation of the kind supplied by a laser. In the case of molecules, the wavelengths corresponding to the energy transitions that occur are mainly established by mechanical motions like rotation and vibration. These motions show up in the infrared region of the spectrum—from beyond the red end of the visible region at 0.8 μm to about 100 μm , where the microwave region begins. The molecules' electrical properties determine the intensities of the energy transitions. In order to determine whether a given type of molecule is present, it is only necessary to pass a range of IR wavelengths through the substance and note the position and intensity of the peaks and valleys of the detected beam. Use of a spectrum "dictionary" then shows what materials are present. 3. The branch of science dealing with the theory and interpretation of spectra.

spectrum—1. A continuous range of electromagnetic radiations, from the longest known radio waves to the shortest known cosmic rays. Light, which is the visible portion of the spectrum, lies about midway between these two extremes. 2. The frequency components that make up a complex waveform. The band of frequencies necessary for transmission of a given type of intelligence. 3. The range of frequencies considered in a system. 4. The distribution of the amplitude of the components of a time-domain signal as a function of frequency. 5. The wavelengths or frequencies associated with any system one may wish to describe, such as the visible spectrum, the infrared spectrum, the entire electromagnetic spectrum, etc. 6. The entire range of electromagnetic energy used in transmission of voice, data, and television. When applied to light, and/or lasers, it includes the frequencies from shortwave ultraviolet through infrared energy.

spectrum analysis—1. The study of energy distribution across the frequency spectrum for a given electrical signal. 2. The process of determining the magnitude of frequency components of a signal, i.e., magnitude of the Fourier transform.

spectrum analyzer—1. A scanning receiver that automatically tunes through a selected frequency spectrum and displays on a CRT or a chart a plot of amplitude versus frequency of the signals present at its input. A spectrum analyzer is, in effect, an automatic Fourier analysis plotter. 2. A test instrument that shows the frequency distribution of the energy emitted by a pulse magnetron. It also is used in measuring the Q of resonant cavities and lines, and in measuring the cold impedance of a magnetron. 3. Test equipment that displays the energy present at all input signal frequencies over a finite period of time. Spectrum analyzers can be synchronized with a sweeping oscillator to display the frequency response of audio equipment or sound systems. 4. An instrument that displays the power or voltage of a time-domain signal as a function of frequency.



Spectrum analyzer.

spectrum intervals—Frequency bands represented as intervals on a frequency scale.

spectrum level—For a specified signal at a particular frequency, the level of that part contained within a band 1 hertz wide, centered at the particular frequency.

spectrum locus—The locus of a point representing the colors of the visible spectrum in a chromaticity diagram.

spectrum-selectivity characteristic—A measure of the increase in the minimum input-signal power over the minimum detectable signal required to produce an indication on a radar indicator, if the received signal has a spectrum different from that of the normally received signal.

spectrum signature analysis—The evaluation of electromagnetic interference from transmitting and receiving equipment in order to determine operational and environmental compatibility.

spectrum utilization characteristics—The compiled data of either transmitters or receivers that describes operational parameters such as bandwidth, sensitivity, stability, antenna pattern, power output, etc. Also describes the capabilities of the equipment to either reject or suppress unwanted electromagnetic energy.

specular reflection—Reflection of light, sound, or radio waves from a surface so smooth that its inequalities are small in comparison with the wavelength of the incident rays. As a result, each incident ray produces a reflected ray in the same plane.

SPEDAC—Acronym for solid-state, parallel, expandable, differential-analyzer computer. A high-speed digital differential analyzer using parallel logic and arithmetic, solid-state circuitry, and modular construction and capable of being expanded in computing capacity, precision, and operating speed.

speech amplifier—A voltage amplifier made specifically for a microphone.

speech audiometer—An audiometer for measuring either live or recorded speech signals.

speech clipper—1. A speech-amplitude-limiting circuit that permits the average modulation percentage of an amplitude-modulated transmitter to be increased. 2. Circuit using one or more biased diodes to limit the wave crests of speech frequency signals. Used in speech amplifiers of transmitters to maintain a high average modulation percentage.

speech compression—1. A modulation technique that makes use of certain properties of the speech signal in transmitting adequate information regarding quality, characteristics, and the sequential pattern of a speaker's voice over a narrower frequency band than otherwise would be necessary. 2. A means of boosting the average level of voice signals to provide increased "talk power" of higher average modulation levels.

speech frequency—See voice frequency.

speech-interference level—A value for rating the effect of background noise on the intelligibility of speech.

speech interpolation—The method of obtaining more than one voice channel per voice circuit by giving each subscriber a speech path in the proper direction only at the times when his or her speech requires it.

speech inverter—An apparatus that interchanges high and low speech frequencies by removing the carrier wave and transmission of only one sideband in a radiotelephone. This renders the speech unintelligible unless picked up by apparatus capable of replacing the carrier wave in the correct manner. See also scrambler circuit.

speech level—The energy of speech (or music), measured in volume units on a volume indicator.

speech scrambler—1. A device to provide privacy to voice communications via wire or radio. (The simplest is an inverter that changes low frequencies to high, and vice versa at the receiving end.) 2. See scrambler circuit.

speech synthesizer—A system used in research to generate speech from electrical signals in order to study human vocal patterns.

speed calling—A feature that allows numbers to be dialed with abbreviated codes.

speed control—The act of precisely increasing or decreasing the speed of a driven gear or shaft by an electrical or mechanical means.

speed limit—A control function that prevents the controlled speed from exceeding prescribed limits.

speed of light—The speed at which light travels: 186,284 miles per second, or 3×10^8 m/s.

speed of sound—Also called sonic speed. The speed at which sound waves travel through a medium (in air and at standard sea-level conditions, about 750 miles per hour or 1080 feet per second, or 329 m/s).

speed of transmission—Also called rate of transmission. The instantaneous rate of processing information by a transmission facility. Usually measured in characters or bits per unit time.

speed-ratio control—A control function that maintains a preset ratio of the speeds of two drives.

speed regulation—A figure of merit indicating the change in motor speed from no load to full load expressed

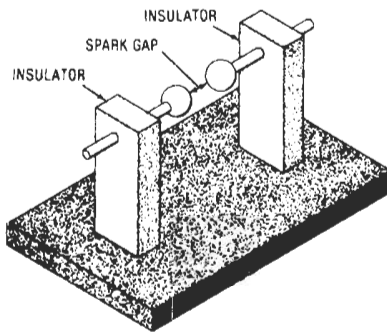
as a percentage of full-load speed. Speed regulation is generally established at rated speed.

speed regulator—A regulator that maintains or varies the speed of a motor at a predetermined rate.

speedup capacitor—1. A capacitor used in RCTL to permit faster turn-on of the transistor in response to a change in input; it also helps overcome the storage delay of the transistor itself. 2. *See* commutating capacitor.

spelling checker—A program that checks the words in a computer file against a previously recorded list, querying or correcting words not on that list.

sphere gap—A spark gap with spherical electrodes. It is used as an excess-voltage protective device.



Sphere gap.

sphere-gap voltmeter—An instrument for measuring high voltages. It consists of a sphere gap, and the electrodes are moved together until the spark will just barely pass. The voltage can be calculated from gap spacing and the electrode diameter, or read directly from a calibrated scale.

spherical aberration—1. Image defects (e.g., blurring) due to the spherical form of a lens or mirror. These defects cause a blurred image because the lens or mirror brings the central and marginal rays to different focuses. Common types of spherical aberration are astigmatism and curvature of the field. 2. The optical error introduced by the fact that incident rays at different distances from the optical axis are focused at different points along the axis by reflection from spherical mirror surfaces or refraction by spherical lenses.

spherical candlepower—In a lamp, the average candlepower in all directions in space. It is equal to the total luminous flux of the lamp, measured in lumens, divided by 4π .

spherical coordinates—A system of polar coordinates that originate in the center of a sphere. All points lie on the surface of the sphere, and the polar axis cuts the sphere at its two poles.

spherical-earth attenuation—Attenuation of radio waves over an imperfectly conducting spherical earth in excess of the attenuation that would occur over a perfectly conducting plane.

spherical earth factor—Ratio between the electrical field strengths that would result from propagation over an imperfectly conducting spherical earth and a perfectly conducting plane.

spherical stylus—A cartridge stylus whose shape is conical, with the downward-facing point of the cone rounded to a specified radius of curvature, usually 0.5 or 0.7 mil (12.7 or 17.8 μm).

spherical wave—A wave in which the wavefronts are concentric spheres.

sphygmocardiograph—A device for simultaneous recording of heartbeat and pulse.

sphygmogram—A graphic recording of the movements, forms, and forces of an arterial pulse.

sphygmomanometer—An instrument for measuring blood pressure, especially that in the arteries.

spider—Highly flexible ring, washer, or punched flat member used in a dynamic speaker to center the voice coil on the pole piece without appreciably hindering the in-and-out motion of the voice coil and its attached diaphragm.

spider bonding—A method used for connecting an integrated-circuit chip to its package leads or to a film-type substrate for hybrid constructions. Instead of running individual wires from each bonding pad on the chip to the corresponding package lead, a preformed lead frame is placed over the chip, and all connections are made by a single operation of a bonding machine.

spider-web antenna—An all-wave receiving antenna having several lengths of doublets connected somewhat like the web of a spider to give favorable pickup characteristics over a wide range of frequencies.

spider-web coil—A flat coil having an open weave somewhat like the bottom of a woven basket. It was used in older radio receivers.

spike—Also called a transient. 1. An abrupt transient that comprises part of a pulse but exceeds its average amplitude considerably. 2. A pulse of short duration and of greater amplitude than an average pulse. 3. A distortion in the form of a pulse waveform of relatively short duration superimposed on an otherwise regular or desired pulse waveform. 4. A burst of extra voltage in a power line, lasting only a fraction of a second.

spike discriminator—A circuit used in a transponder to discriminate against pulses of extremely short duration, such as might be caused by ignition noise.

spike-leakage energy—The radio-frequency energy per pulse transmitted through tr and pre-tr tubes before and during the establishment of the steady-state radio-frequency discharge.

spike noise—In a chopper, the static field noise caused by insulating material; can be observed if the chopper is followed by a wideband amplifier.

spiking—Short, multiple, irregular bursts of laser-output radiation. Spiking is characteristic of pulse lasers, especially flash-pumped solid-dielectric types (e.g., ruby, neodymium in glass). The spike duration is typically 0.2 to 2 microseconds.

spill—The redistribution and hence loss of information from a storage element of a charge-storage tube.

spillover positions—Storage positions in which backlogged traffic that accumulates when a send channel is inoperative or unusually busy is held for transmission immediately on the availability of a channel.

spin block—A loop created when a process keeps checking the state of a flag or status bit while waiting for an event to occur.

spindle—The upward-projecting shaft used on a phonograph turntable for positioning and centering the record.

spinel—*See* silicon on sapphire.

spinner—1. An automatically rotatable radar antenna, together with its associated equipment. 2. The part of a mechanical scanner that is rotated about an axis; generally, use of the term is restricted to cases of relatively high-speed rotation.

spinning electron—An electron that spins with an angular momentum.

spinthariscopes—An instrument for viewing the scintillations of alpha particles on a luminescent screen.

spin wave—A moving magnetic disturbance in a ferrite. The presence of an alternating magnetic field with its frequency near that of the natural precessional frequency of a spin tends to increase the precession angle. This increase in precession angle is passed from atom to atom by dipole and exchange interactions.

spin-wave amplitude—The difference between the precession angles of two spins.

spiral distortion—In camera tubes or image tubes using magnetic focusing, a form of distortion in which image rotation varies with distance from the axis of symmetry of the electron optical system.

spiral four—A quad in which the four conductors are twisted about a common axis, the two sets of opposite conductors being used as pairs.

spiral scanning—Scanning in which the maximum radiation describes a portion of a spiral, with the rotation always in one direction.

spkr—Abbreviation for speaker.

SPL—Abbreviation for sound-pressure level.

splashproof—A device or machine so constructed and protected that external splashing will not interfere with its operation.

splashproof motor—An open motor in which the ventilating openings are so constructed that drops of liquid or solid particles falling on it, or coming toward it in a straight line at any angle not greater than 100° from the vertical, cannot enter either directly or by striking and running along a surface of the motor.

splatter—Adjacent-channel interference due to overmodulation of a transmitter by abrupt peak audio signals. It is particularly noticeable for sounds containing high-frequency harmonics.

splice—1. A device used for joining two or more conductors. 2. A joint connecting conductors with good mechanical strength and good conductivity; a terminal that permanently joins two or more wires. 3. Nonseparable junction joining optical conductor to optical conductor. 4. An in-line connection between two wires that results in a single conductor. 5. A physical join between pieces of tape. 6. A connection of two cables in which each pair in one cable is connected to the corresponding pair in the other.

splice insulation—Insulation used over a splice.

splicer—Any device that holds magnetic recording tape ends in place for properly aligned splices. Many splicers are automatic to some extent, emitting the tape and trimming the edges of the splice by means of built-in cutting edges.

splicing block—1. A nonautomatic recording tape splicer consisting of an elongated block of metal or plastic with a shallow groove to hold the tape and a narrow slot, usually diagonal, across the middle of the block to guide the cutting blade. Splices are made with a special splicing tape that generally needs no edge trimming. 2. A tool for tape editing consisting of a nonmagnetic metal block with a guide channel that holds magnetic recording tape in precise alignment. Additional straight and diagonal grooves provide a path for a razor blade to follow for cutting the tape so it can be spliced effectively.

splicing loss—See coupling loss, 1.

splicing tape—A pressure-sensitive, nonmagnetic tape designed for joining two pieces of magnetic tape; characterized by high flexibility and an adhesive that will not flow out from under the splice and, thus, cause adhesion between adjacent layers on the reel.

splice—A piecewise curve adhering to certain continuity conditions at the node points.

split—1. Of radar tracks, the separation of radar data from a single track to such a degree that one or more additional tracks can be initiated manually or automatically; a similar condition exists when a raid is separated to such an extent that it can be represented on a situation display as two or more raids. 2. Initiation of split tracks, raids, or groups by a direction center track monitor or by programming means.

split-anode magnetron—A magnetron with an anode divided into two segments, usually by parallel slots.

split-conductor cable—A cable in which each conductor is composed of two or more insulated conductors normally connected in parallel.

split fitting—A conduit fitting, bend, elbow, or tee split longitudinally so that it can be positioned after the wires have been drawn into the conduit. The two parts are held together usually by screws.

split frequency—The frequencies between the 10-kHz channels assigned by the FCC for use by U.S. broadcasters.

split gear—A type of gear designed to minimize backlash. The method consists of splitting one gear of a meshing pair and so connecting a spring between the two halves that pressure is exerted on both sides of the teeth of the other gear.

split hydrophone—A direction hydrophone in which the electroacoustic transducers are divided and arranged so that each division can induce a separate electromotive force between its own terminals.

split image—Two or more scenes appearing on a television screen as a result of trick photography at the studio.

split-phase—Characteristic of any device (such as an induction motor) that derives a second phase from a single-phase alternating current source by using a capacitive or inductive reactor.

split-phase motor—1. A single-phase induction motor having an auxiliary winding connected in parallel with the main winding, but displaced in magnetic position from the main winding so as to produce the required rotating magnetic field for starting. The auxiliary circuit is generally opened when the motor has reached a predetermined speed. 2. A single-phase induction motor that is momentarily converted to two-phase (polyphase, self-starting) motor by inclusion of an additional primary power winding displaced 90° from the main windings to provide required starting torque. Occasionally the auxiliary windings are designed to operate full time rather than momentarily.

split projector—A directional projector in which electroacoustic transducing elements are divided and arranged so that each division can be energized separately through its own terminals.

split rotor plate—See serrated rotor plate.

split-sound system—An early television receiver IF system in which the audio and video IF signals were separated right after the mixer stage and amplified in separate IF stages. Replaced by the more current intercarrier sound system.

split-stator capacitor—A capacitor comprising two isolated stators that function in series with a common rotor.

split-stator variable capacitor—A variable capacitor with a rotor section common to two separate stator sections. Used for balancing in the grid and plate tank circuits of transmitters.

split-streaming—See bandsplitting.

splitter—1. A device with one input that provides two or more outputs to allow multiple receiver hookups to one antenna. Can be passive (an antenna coupler) or active, providing gain. 2. A passive device similar

to an antenna coupler but designed to match a 75-ohm impedance. 3. A device that takes a signal and splits it into two or more identical but lower power signals.

split transducer — A directional transducer in which electroacoustic transducing elements are divided and arranged so that each division is electrically separate.

split winding — An equal division of a winding that will allow series or parallel external connection of the divided winding (four external leads) of a servomotor.

spoiler — A rod grating mounted on a parabolic reflector to cause the radiation pattern to change from a pencil beam to a cosecant-squared pattern. When the reflector and grating are rotated through 90° with respect to the feed antenna, one pattern changes to the other.

spontaneous emission — 1. Emission occurring without stimulation or quenching after excitation. 2. Radiation produced when a quantum mechanical system falls spontaneously from an excited state to a lower state. Emission of this radiation occurs in accordance with the laws of probability and without regard for the presence of similar radiation at the same time.

spoofing — The defeat or compromise of an alarm system by tricking or fooling its detection devices, such as by short circuiting part or all of a series circuit, cutting wires in a parallel circuit, reducing the sensitivity of a sensor, or entering false signals into the system. Spoofing contrasts with circumvention.

spool — A flanged form serving as the foundation on which a coil is wound.

spooler — A system program that permits I/O transfers to be queued for an I/O device, thereby permitting the requesting task to continue executing even when it cannot immediately use the I/O device. Spoolers are commonly used with very slow sequential-output-only devices, such as printers.

spoofing — Abbreviation for simultaneous peripheral operations online. Process of allowing programs using slow output devices to complete execution rapidly. Data is temporarily stored in buffers or queues for later low-speed transmission concurrent with normal system operation.

sporadic E ionization — Ionization that appears in the atmosphere at E-layer heights, is more noticeable at higher latitudes, and occurs at all times of the day. It may be caused by particle radiation from the sun.

sporadic E layer — A portion that sometimes breaks away from the normal E layer in the ionosphere and exhibits unusual erratic characteristics.

sporadic propagation — Abnormal and unpredictable radio transmission that only occurs occasionally. Caused by unusual intense ionization in some part of the E layer of the ionosphere.

sporadic reflections — Also called abnormal reflections. Sharply defined, intense reflections from the sporadic E layer. Their frequencies are higher than the critical frequency of the layer, and they occur anytime, anywhere, and at any frequency.

spot — 1. The area instantaneously affected by the impact of an electron beam of a cathode-ray tube. 2. See land. 3. The smallest luminescent area of the screen surface instantaneously excited by the impact of an electron beam.

spot beam — A satellite beam that covers a relatively small geographical area.

spot bonding — See yield-strength-controlled bonding.

spot distortion — Undesirable asymmetry or defect in the spot shape.

spot jamming — Jamming of a specific frequency or channel.

spot noise factor — See spot noise figure.

spot noise figure — Also called spot noise factor. Ratio of the output noise of a transducer to the portion attributable to the thermal noise in the input termination when the termination has a standard noise temperature (290°K). The spot noise figure is a point function of input frequency.

spot projection — In facsimile: 1. An optical method in which the scanning or recording spot is delineated by an aperture between the light source and the subject copy or record sheet. 2. The optical system in which the scanning or recording spot is the size of the area being scanned or reproduced.

spot protection — Protection of objects such as safes, art objects, or anything of value that could be damaged or removed from the premises.

spot size — The smallest area of light that can be produced by a CRT.

spot speed — 1. In facsimile, the length of the scanning line times the number of lines per second. 2. In television, the product of the length (in units of elemental area, i.e., in spots) of the scanning line and the number of scanning lines per second.

spottiness — Bright spots scattered irregularly over the reproduced image in a television receiver due to human-made or static interference entering the television system at some point.

spot welding — 1. A resistance welding process whereby welds are made between two or more overlapping sheets of metal by pressing them together between two electrodes arranged to conduct current to the outer surfaces of the overlapped sheets. The tips of one or both of the electrodes are restricted in area to approximately the diameter of the spot weld desired. 2. Resistance welding in which the current is directed through the entire area under the electrode tip. Welding is usually performed by a rocker-arm type spot welder.

spot wobble — An externally produced oscillating movement of an electron beam and its resultant spot. Spot wobble is used to eliminate the horizontal lines across the screen and thus make the picture more pleasing.

spray fluxing — A specialized wave-solder fluxing technique in which a fine stainless-steel screen drum is rotated in liquid flux. The amount of flux transferred is controlled by the rotational speed of the drum and air pressure. The drum contains air jets. See also brush fluxing; foam fluxing; wave fluxing.

spray-gun soldering — Soldering fluxed and heated parts by blowing molten solder on them from a gas or electrically heated gun.

spreader — 1. An insulating crossarm used to hold the wires of a transmission line apart. 2. The crossarm separating the parallel wire elements of an antenna.

spread groove — A groove cut between recordings. The groove, which has an abnormally high pitch, separates the recorded material but still enables the stylus to travel from one to the next.

spreading anomaly — That part of the propagation anomaly that is identifiable with the geometry of the ray pattern.

spreading loss — The transmission loss suffered by radiant energy. The effect of spreading, or divergence, is measured by this loss.

spreadsheet — 1. A computer program that sets up an electronic spreadsheet in which the lines and columns are automatically calculated according to formulas chosen by the user. When one number is changed, the program will automatically change all the sums and multiples that are affected. 2. A program that provides automatic calculations on any numbers and formulas that are input.

spread spectrum transmission — 1. A communications technique that involves transmitting information

that has been multiplied by a pseudo-random noise (PN) sequence that essentially spreads it over a relatively wide frequency bandwidth. The receiver detects and uses the same PN sequence to “despread” the frequency bandwidth and decode the transmitted information. This communications technique allows greater signal density within a given transmission bandwidth and also provides a high degree of signal encryption and security in the process. 2. A communications technique in which many different signal waveforms are transmitted in a wide band. Power is spread thinly over the band so narrow-band radios can operate within the wide band without interference.

spring—A resilient, flat piece of metal forming or supporting a contact member in a jack or a key.

spring-actuated stepping relay—A stepping relay in which cocking is done electrically and operation is produced by spring action.

spring contact—1. A relay or switch contact, usually of phosphor bronze and mounted on a flat spring. 2. A device employing a current-carrying cantilever spring that monitors the position of a door or window.

spring contact probe—Also called spring pin or spring probe. The element that provides the electrical connection between a particular node on the product to be tested and the verifier electronics. Usually spring loaded to allow some thickness, lead length, and other product variations.

spring curve—A plot of the spring force on the armature of a relay versus armature travel.

spring-finger action—The design of a contact, as used in a printed circuit connector or a socket contact, permitting easy stress-free spring action to provide contact pressure and/or retention.

spring pile-up—An assembly of all contact springs operated by one armature lever.

spring-return switch—A switch that returns to its normal position when the operating pressure is released.

spring stop—In a relay, the member used to control the position of a pretensioned spring.

spring stud—In a relay, an insulating member that transmits the armature motion from one movable contact to another in the same pileup.

sprocket holes—Holes punched on each line of a perforated tape used as a timing reference and for driving certain transports.

sprocket pulse—1. A pulse generated by one of the magnetized spots that accompany every character recorded on magnetic tape. During read operations, sprocket pulses permit regulation of the timing of the read circuits and provide a count of the number of characters read from the tape. 2. A pulse generated by a sprocket or driving hole in a paper tape; this pulse serves as the timing pulse for reading or punching the tape.

SPST—Abbreviation for single-pole, single-throw. A two-contact switching arrangement that opens or closes one circuit; the circuit may be normally open or normally closed.

spurious counts—See spurious tube counts.

spurious emanations—Unintentional and undesired emissions from a transmitting circuit.

spurious emission—See spurious radiation.

spurious modulation—Undesired modulation of an oscillator; for example, frequency modulation resulting from mechanical vibration.

spurious pulse—In a scintillation counter, a pulse not purposely generated or directly due to ionizing radiation.

spurious pulse mode—An unwanted pulse mode that is formed by the chance combination of two or more pulse modes and is indistinguishable from a pulse interrogation or reply.

spurious radiation—Also called spurious emission. Emissions from a radio transmitter at frequencies outside its assigned or intended emission frequency. Spurious emissions include harmonic emissions, parasitic emissions, and intermodulation products, but exclude emissions in the immediate vicinity of the necessary band, which are a result of the modulation process for the transmission of information.

spurious response—1. Any undesired response from an electric transducer or similar device. 2. The sensitivity of a circuit to signals of frequencies other than the frequency to which the circuit is tuned. 3. In electronic warfare, undesirable signal images in the intercept receiver as a result of mixing of the intercepted signal with harmonics of the receiver local oscillators. 4. A characteristic of a spectrum analyzer wherein displays appear that do not conform to the calibration of the radio-frequency dial. 5. Response of a frequency-selective system to an undesired frequency.

spurious-response attenuation—The ability of a receiver to discriminate between a desired signal to which it is resonant and an undesired signal at any other frequency to which it is simultaneously responsive.

spurious-response ratio—Ratio of the field strength at the frequency that produces a spurious response to the field strength at the desired frequency, each field being applied in turn to produce equal outputs. Image ratio and intermediate-frequency response ratio are special forms of spurious-response ratio.

spurious-response rejection—The ability of an FM tuner to reject spurious signals falling outside the tuned frequency, or the immunity of the tuner itself to the production of spurious signals as the result of intermodulation, etc.

spurious signal—1. An unwanted signal generated either in the equipment itself or externally and heard (or seen) as noise. 2. Undesired signals appearing external to an equipment or circuit. They may be harmonics of existing desired signals, high-frequency components of complex waveshapes, or signals produced by incidental oscillatory circuits. 3. An undesired false signal.

spurious transmitter output—Any component of the radio-frequency output that is not implied by the type of modulation and the specified bandwidth.

spurious transmitter output, conducted—A spurious output of a radio transmitter that is conducted over a tangible transmission path such as a power line, control circuit, radio-frequency transmission line, waveguide, etc.

spurious transmitter output, extraband—A spurious transmitter output that lies outside the specified band of transmission.

spurious transmitter output, inband—A spurious transmitter output that lies within the specified band of transmission.

spurious transmitter output, radiated—A spurious output radiated from a radio transmitter. (The associated antenna and transmission lines are not considered part of the transmitter.)

spurious tube counts—Also called spurious counts. The counts in radiation-counter tubes other than background counts and those caused directly by the radiation to be measured. They are caused by electrical leakage, failure of the quenching process, etc.

spurt tone—A short-duration audio-frequency tone used for signaling or dialing selection.

sputtering—Also called cathode sputtering. 1. A process sometimes used in the production of a metal master disc. In this process the original is coated with an electric conducting layer by means of an electric discharge in a vacuum. 2. A thin-film technique in which

material for the film is ejected from the surface of the bulk source when the source is subjected to ion bombardment. 3. Dislocation of surface atoms of a material bombarded by high-energy atomic particles. 4. A method of depositing a thin film or material onto a substrate. The substrate is placed in a large demountable vacuum chamber having a cathode made of the metal or ceramic to be sputtered. The chamber is then operated so as to bombard the cathode with positive ions. As a result, small particles of the material fall uniformly on the substrate. 5. A deposition process wherein a surface, or target, is immersed in an inert-gas plasma and is bombarded by ionized molecules that eject surface atoms. The process is based on the disintegration of the target material under ion bombardment. Atoms broken away from the target material by gas ions deposit on the part (substrate), forming a thin film.

SQ—A matrix system developed by CBS, Inc.

s-quad—Also called simple quad. An arrangement of two parallel paths, each of which contains two elements in series.

square—A unit area, i.e., the ratio of length/width = 1.

square-law demodulator—See square-law detector.

square-law detection—Detection in which the output voltage is substantially proportional to the square of the input voltage over the useful range of the detector.

square-law detector—Also called square-law demodulator. A detector in which the output signal current is proportional to the square of the radio-frequency input voltage. Operation of this circuit depends on nonlinearity of the detector characteristic, rather than on rectification.

square-law scale meter—A meter in which the deflection is proportional to the square of the applied energies.

square-loop ferrite—A ferrite with a rectangular hysteresis loop.

square-loop material—Ferromagnetic material having a squareness ratio approaching 1. Compare rectangular loop.

squareness—The ratio of the residual induction to the maximum induction obtained at the maximum magnetizing field being used. It can be considered as a figure of merit of the flatness of the decaying magnetizing curve.

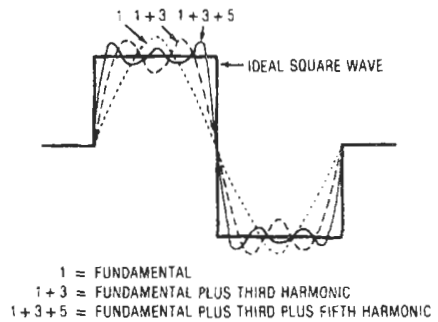
squareness ratio—1. For a magnetic material in a symmetrically cyclically magnetized condition, the ratio of the flux density at zero magnetizing force to the maximum flux density. 2. The ratio of the flux density to the maximum flux density when the magnetizing force has changed halfway from zero toward its negative limiting value.

square wave—1. A square- or rectangular-shaped periodic wave that alternately assumes two fixed values for equal lengths of time, the transition time being negligible in comparison with the duration of each fixed value. 2. An ac periodic waveform in which voltage alternates rapidly from a positive peak value to the negative peak value, and vice versa, after a delay.

square-wave amplifier—A resistance-coupled amplifier (in effect, a wideband video amplifier) that amplifies a square wave with a minimum of distortion.

square-wave generator—A signal generator for producing square or rectangular waves. It is useful for testing the frequency response of wideband devices. See also square-wave testing.

square-wave response—In camera tubes, the ratio of the peak-to-peak signal amplitude given by a test pattern consisting of alternate black and white bars of equal widths to the difference in signal between large areas of black and white having the same illuminations



Square wave showing harmonic composition.

as the bars. Horizontal square-wave response is measured if the bars are perpendicular to the horizontal scan, and vertical square-wave response is measured if they are parallel.

square-wave testing—The use of a square wave signal to test the frequency response of a wideband device. The output wave seen on an oscilloscope will show how much the square wave was distorted in passing through the device.

squaring circuit—1. A circuit that changes a sine wave or other wave into a square wave. 2. A circuit that contains nonlinear elements and that produces an output voltage proportional to the square of the input voltage.

squawker—The midrange speaker of a three-way system.

squeal—1. Audible tape vibrations, primarily in the longitudinal mode, caused by a frictional excitation at the heads and guides. 2. In a radio receiver, a high-pitched tone heard together with the wanted signal.

squealing—The high-pitched noise heard along with the desired intelligence in a radio receiver. It is due to interference between stations or to oscillation in one of the receiver circuits.

squeegee—The part of a screen printer used in thick-film circuit manufacturing that pushes the composition across the screen and through the mesh onto the substrate.

squeezable waveguide—In radar, a variable-width waveguide for shifting the phase of the radio-frequency wave traveling through it.

squeeze section—A length of waveguide whose critical dimension can be altered to correspond to changes in the electrical length.

squeeze track—A variable-density sound track in which variable width with greater signal-to-noise ratio is obtained by means of adjusting masking of the recording light beam and simultaneously increasing the electric signal applied to the light modulator.

squegger—A self-quenching oscillator in which the suppression occurs in the grid circuit.

squegging—A self-blocking condition in an oscillator circuit.

squegging oscillator—See blocking oscillator, 1.

squelch—To automatically quiet a receiver by reducing its gain in response to a specified characteristic of the input.

squelch circuit—1. A circuit for preventing a radio receiver from producing an audio-frequency output in the absence of a signal having predetermined characteristics. A squelch circuit may be operated by signal energy in the receiver passband, by noise quieting, or by a combination of the two (ratio squelch). It may also be

operated by a signal having modulation characteristics (selective squelch). 2. A circuit that silences a receiver in the absence of signals above a certain level of signal strength. This squelch threshold is usually adjustable and will stop background noise from reaching the speaker but will activate the receiver when an intelligible signal is detected.

squib—Contained powder charge and initiating device that, when energized, produces heat and pressure.

squint—In radar, an ambiguous term meaning either the angle between the two major-lobe axes in a lobe-switching antenna or the angular difference between the axis of antenna radiation and a selected geometric axis such as the axis of the reflector.

squint angle—The angle between the physical axis of the antenna center and the axis of the radiated beam.

squirrel-cage induction motor—An induction motor in which the secondary circuit, usually the rotor, consists of a squirrel-cage winding (two discs connected along their circumference with copper bars) arranged in slots in the iron core.

squirrel-cage motor—A rugged electric motor that basically consists of two components: a wound stator and the rotor assembly, which most typically consists of a laminated cylindrical iron core with slots for conductors. The unit rotates when a moving magnet field induces a current in the shorted rotor conductors.

squirrel-cage winding—A permanently short-circuited winding that is usually uninsulated and has its conductors uniformly distributed around the periphery of the machine, and is joined by continuous end rings.

squitter—In radar, random firing (intentional or otherwise) of the transponder transmitter in the absence of interrogation.

SRAM—Abbreviation for static random-access memory. A read/write memory in which the data are latched and retained. SRAMs do not lose their contents as long as power is on. This memory does not need to be refreshed as does a DRAM.

S/rf meter—An indicator on some CB transceivers to indicate relative strength of an intercepted signal when receiving, and the relative rf power output when transmitting.

SSB—See single sideband.

SSFM—A system of multiplex in which single-sideband subcarriers are used to frequency modulate a second carrier.

SSI—Abbreviation for small-scale integration. 1. A classification of ICs by size, applicable to chips that contain less than 12 gates or circuits of equivalent complexity. 2. A circuit of under 10 gates, generally involving one metallization level implementing one circuit function in monolithic silicon. 3. The earliest form of integrated-circuit technology. A typical SSI circuit contains from one to four logic circuits.

SS loran—Sky-wave-synchronized loran. Loran in which the slave station is controlled by the sky wave from the master station rather than the ground wave. This method is used with unusually long base lines.

SSPM—A system of multiplex in which single-sideband subcarriers are used to phase-modulate a second carrier.

SSR—Abbreviation for solid-state relay.

SSTV—Abbreviation for Slow Scan Television. 1. Sending still images (usually black and white) by means of audio tones over telephone lines or on the MF/HF bands. Transmission times vary from a few seconds to several minutes. 2. A television system that employs a slow rate of horizontal scanning suitable for transmission of printed matter, photographs, and illustrations.

stability—1. The ability of a component or device to maintain its nominal operating characteristics after being subjected to changes in temperature, environment, current, and time. It is usually expressed in either percent or parts per million for a given period of time. 2. The ability of a power supply to maintain a constant output voltage (or current) over a period of time under fixed conditions of input, load, and temperature. Usually expressed in terms of a voltage (or current) change over a fixed length of time. 3. The ability to maintain effectiveness within reasonable bounds in spite of large changes in environment. 4. For a feedback-control system or element, the property such that its output will ultimately attain a steady-state dc level within the linear range and without continuing external stimuli. 5. The overall ability of a resistor to maintain its initial resistance value over extended periods when subjected to any combination of environmental conditions and electrical stresses. 6. The ability of a motor-control system to operate at or near a constant speed over a wide load range without oscillations in speed (hunting). 7. A measure of deviations from a rated output over long periods. 8. Fluctuations in accuracy, or drift, over a given period.

stability factor—The measure of the bias stability of a transistor amplifier. It is defined as the change in collector current, I_C , per change in cutoff current, I_{C_0} .

stabilivolt—A gas-filled tube containing a number of concentric, coated iron electrodes. It is used as a source of practically constant voltage for apparatus drawing only small currents.

stabilization—1. The introducing of stability into a circuit. 2. A process by means of which the output of electromechanical transducers is optimized by adjusting magnetic and mechanical parameters for its maximum magnetic permanency, to maintain its output stable under changing environmental and external conditions. 3. The reduction of variations in voltage or current not due to prescribed conditions. 4. The treatment of a permanent-magnet material designed to increase the permeance of its magnetic properties. This process may include such conditions as heat, shock, or demagnetizing fields so that the magnet will produce a constant magnetic field. Stabilization generally refers only to magnetic stability wherein if the disturbing influence were removed and the magnet remagnetized, any magnetic changes can be completely restored. Flux changes caused by internal structural changes are permanent in character and cannot be restored simply by remagnetization.

stabilization bake—A preconditioning performed on finished material to ensure reliability in commercial end use. In semiconductors this procedure accelerates any inherent metallurgical and/or chemical degradation within the device and takes care of over 95 percent of the failures due to infant mortality. In addition, it acts to stabilize such semiconductor parameters as current gain (beta), breakdown voltage, and diode leakage.

stabilization network—A network used to prevent oscillation in an amplifier with negative feedback.

stabilized feedback—See negative feedback.

stabilized flight—A type of flight in which control information is obtained from inertia-stabilized references such as gyroscopes.

stabilized local oscillator—An extremely stable radio-frequency oscillator used as a local oscillator in the superheterodyne radar receiver in a moving-target indicator system.

stabilized master oscillator—The master oscillator in complex microwave systems that acts as the frequency reference for all rf signals within the system. Usually crystal and temperature controlled for maximum frequency stability.

stabilized shunt-wound motor—A shunt-wound motor to which a light series winding has been added to prevent a rise in speed, or to reduce the speed when the load increases.

stabilized winding—Also called tertiary winding. An auxiliary winding used particularly in star-connected transformers to (a) stabilize the neutral point of the fundamental frequency voltage, (b) protect the transformer and the system from excessive third-harmonic voltages, or (c) prevent telephone interference caused by third-harmonic currents and voltages in the lines and earth.

stabistor—A voltage-limiting semiconductor. A diode designed to break over and conduct at a certain voltage. This is the normal forward conduction of a diode and is also characteristic of Zener diodes, which avalanche into conduction when breakdown (backward) voltage is exceeded.

stable element—In navigation, an instrument or device that maintains a desired orientation independently of the vehicle motion.

stable oscillation—A response that does not increase indefinitely with time; the opposite of an unstable oscillation.

stable platform—Also called a gyrostabilized platform. A gyro instrument that provides accurate azimuth, pitch, and roll attitude information. In addition to serving as reference elements, they are used for stabilizing accelerometers, star trackers, and similar devices in space.

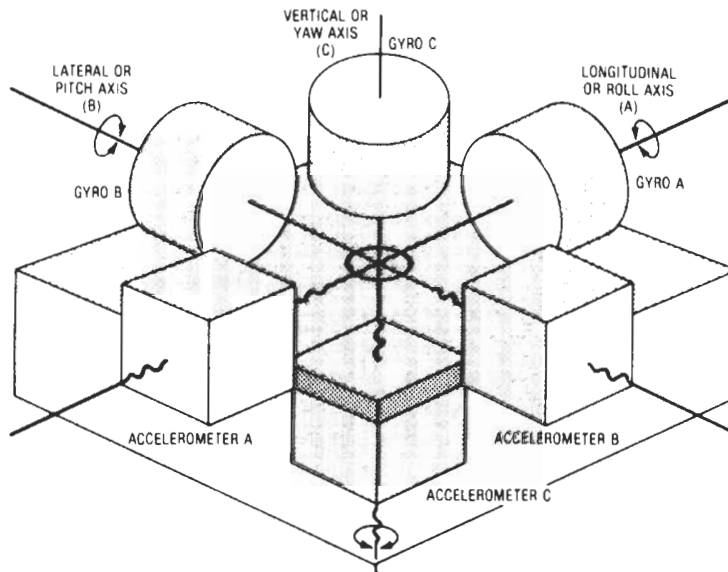
stable strobe—A series of strobes that behaves as if caused by a single jammer.

stack—1. That portion of a computer memory and/or registers used to temporarily hold information, usually the contents of the internal registers within a microprocessor chip. 2. *See* pileup, 1. 3. A block of successive memory locations that is accessible from one end on a last-in first-out basis (LIFO). The stack is coordinated with the stack pointer, which keeps track of storage and retrieval of each byte of information in the stack. A stack may be any block of successive information locations in the read/write memory. 4. A series of extra data registers, found especially in calculators using reverse Polish notation. The stack is used as a “first-in, last-out”

type of memory. Data is shifted into the stack by pressing an operational key, and is shifted down by pressing an operational key. The lowest registers and any subsequent registers on a nonrandomly accessible basis allow storage of intermediate results prior to their reuse with a later completing operation. Thus, access to parentheses (brackets) is automatic on pressing the ENTER key. A four-level stack (X, Y, Z, t) has the capability of three levels of parentheses (three sets of brackets). 5. A data area allocated to a process from which individual stack frames are allocated. 6. A region of memory that works by special rules. Each time the computer stores a word there, it goes on top of the stack and all the previously stored words move down one level. When a computer takes a word off the top of the stack, everything moves up one level, until the stack is empty. The computer has access only to the top of the stack. Piling a word on the stack is called a push, and taking a word off is called a pull or a pop. 7. A sequence of memory locations used in LIFO (last-in, first-out) fashion that stores, or stacks, computer words when the computer receives an interrupt request. A stack pointer specifies the last-in entry (or where the next-in entry will go). 8. A dynamic, sequential data list, usually contained in system memory, having special provisions for program access from one end or the other. Storage and retrieval of data from the stack is generally automatically performed by the processor. 9. A last-in, first-out structure that preserves the chronological ordering of information. Stacks are necessary for subroutines and interrupt management. A stack is manipulated by two basic instructions: push and pop.

stacked array—1. An antenna system consisting of two or more antennas connected together and placed with respect to each other to increase the gain in a specific direction or directions. 2. A group of several identical microwave antennas placed one above the other to increase the gain of an antenna. They are connected in proper phase relationship, so that their signals are additive.

stacked-beam radar—A three-dimensional radar system in which elevation information is derived by



Stable platform.

emitting narrow beams placed one above the other to cover a vertical segment, azimuth information is obtained by horizontal scanning of the beam, and range information is obtained from the echo-return time.

stacked-diode laser—A type of laser used when a great amount of power is required. Avoiding the bulk of large numbers of optical lenses, this instrument offers high output intensity and a small emitting region at reasonable drive currents.

stacked dipole antenna—Antenna in which the antenna directivity is increased by providing a number of identical dipole elements, excited either directly or parasitically. The resultant radiation pattern will depend on the number of dipole elements used, the spacing and phase difference between the elements, and the relative magnitudes of the currents.

stacked heads—Also called inline heads. An arrangement of magnetic recording heads used for stereophonic sound. The two heads are directly in line, one above the other.

stack frame—A contiguous data area allocated for every activation of a routine; holds parameter values, local variables, temporary variables, and return-linkage information.

stack pointer—1. A register that comes into use when the microprocessor must service an interrupt—a high-priority call from an external device for the central processing unit to suspend temporarily its current operations and divert its attention to the interrupting task. A CPU must store the contents of its registers before it can move on to the interrupt operation. It does this in a stack, so named because information is added to its top, with the information already there being pushed further down. The stack thus is a last-in, first-out type of memory. The stack-pointer register contains the address of the next unused location in the stack. 2. The counter or register used to address a stack in the memory.

stage—1. A term usually applied to an amplifier to mean one step, especially if part of a multistep process; or the apparatus employed in such a step. 2. A hydraulic amplifier used in a servovalve. Servovalves may be single-stage, two-stage, three-stage, etc. 3. A single section of a multisection circuit or device.

stage-by-stage elimination—A method of locating trouble in electronic equipment by using a signal generator to introduce a test signal into each stage, one at a time, until the defective stage is found.

stage efficiency—Ratio of useful power (alternating current) delivered to the load to the power at the input (direct current).

stagger—Periodic positional error of the recorded spot along a recorded facsimile line.

staggered heads—An infrequently used arrangement of magnetic recording heads for stereophonic sound. The heads are $1\frac{1}{32}$ inch (30.95 mm) apart. Stereo tapes

recorded with staggered heads cannot be played on recorders using stacked heads, and vice versa.

staggered tuning—A means of producing a wide bandwidth in a multistage IF amplifier by tuning to different frequencies by a specified amount.

staggering—The offsetting of two channels of different carrier systems from exact sideband-frequency coincidence in order to avoid mutual interference.

staggering advantage—A reduction in intelligible crosstalk between identical channels of adjacent carrier systems as a result of using slightly different frequency allocations for the different systems.

stagger time—The interval between the times of actuation of any two contact sets.

stagger-tuned amplifier—An amplifier consisting of two or more stages, each tuned to a different frequency.

stagnation thermocouple—A type of thermocouple in which a high recovery factor is achieved by stagnating the flow in a space surrounding the junction. This results in a high response time as compared with an exposed junction.

staircase—A video test signal containing several steps at increasing luminance levels. The staircase signal is usually amplitude modulated by the subcarrier frequency and is useful for checking amplitude and phase linearities in video systems.

staircase generator—A special-purpose signal generator that produces an output that increases in steps; thus, its output waveform has the appearance of a staircase.

staircase signal—A waveform consisting of a series of discrete steps resembling a staircase.

stall torque—1. The torque that the rotor of an energized motor produces when restrained from motion. 2. The torque developed by a servomotor at speed in excess of 1 rpm but less than 0.5 percent of the synchronous speed with a rated voltage and frequency of the proper phase relationship applied to both windings. 3. See holding torque.

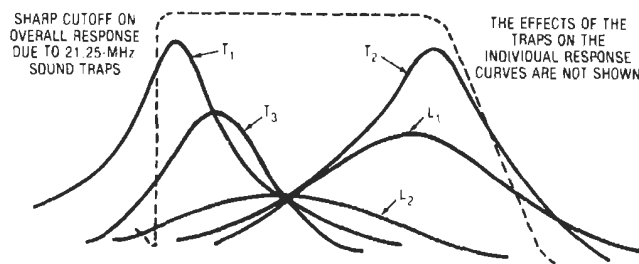
stalled-torque control—A control function used to control the drive torque at zero speed.

stalo—Acronym for stabilized local oscillator. A highly stable oscillator, usually stabilized by feedback from a very high- Q LC circuit such as a high- Q cavity. Used as part of a moving-target indication device in conjunction with a radar.

stamped printed wiring—Wiring that is produced by die stamping and that is bonded to an insulating base.

stamper—A negative (generally made of metal by electroforming) from which finished records are molded.

stand-alone—1. Pertaining to a device that requires no other piece of equipment along with it to complete its own operation or function. 2. A system or piece of equipment that is capable of doing its job without being



Staggered tuning.

connected to anything else. 3. Self-contained, not requiring any special add-ons or supports, e.g., a stand-alone word processor. 4. Word-processing equipment that contains all the necessary components within itself, allowing it to operate entirely by itself. This and shared logic are the two major types of word-processing equipment.

stand-alone system—A microcomputer software development system that runs on a microcomputer without connection to another computer or a time-sharing system. This system includes an assembler, editor, and debugging aids. It may include some of the features of a prototyping kit.

stand-alone terminal—See intelligent terminal.

standard—1. An exact value, or a concept established by authority, custom, or agreement, that serves as a model or rule in the measurement of a quantity or in the establishment of a procedure. 2. A device used to maintain continuity of value in the units of measurement by periodic comparison with higher-echelon or national standards. 3. An agreement on a definition. By referencing standards, which may be either test methods or physical or electrical descriptions, a component or system having desired properties may be obtained. 4. A specification for data communication that is widely accepted and implemented by communications vendors. Standards may be formal (published by a recognized standards organization) or de facto (accepted without formal publication).

standard antenna—An open single-wire antenna, including the lead-in wire, having an effective height of four meters.

standard beam approach—Abbreviated SBA. A VHF, 40-MHz continuous-wave low-approach system using a localizer and markers. The two main-signal lobes are tone-modulated with the Morse-code letters *E* and *T* (• and —). These modulations form a continuous tone when the aircraft is on its course. The airborne equipment is usually instrumented for visual reference, but may be used aurally in some applications.

standard broadcast band—The band of frequencies extending from 530 to 1710 kilohertz.

standard broadcast channel—The band of frequencies occupied by the carrier and two sidebands of a broadcast signal. The carrier frequency is at the center, with the sidebands extending 5 kHz on either side.

standard broadcast station—A radio station operated on a frequency between 530 and 1710 kHz for the purpose of transmitting programs intended for reception by the general public.

standard candle—A unit of candlepower equal to a specified fraction of the visible light radiated by a group of 45 carbon-filament lamps preserved at the National Bureau of Standards, the lamps being operated at a specified voltage. The standard candle was originally the amount of light radiated by a tallow candle of specified composition and shape.

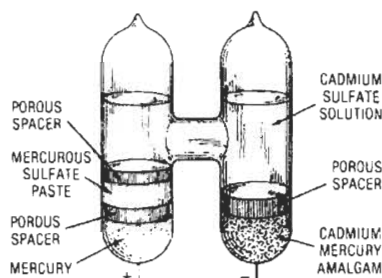
standard capacitor—A capacitor whose capacitance is not likely to vary. It is used chiefly in capacitance bridges.

standard cell—1. A primary cell that serves as a standard of voltage. 2. Predefined circuit elements that may be selected and arranged to create a custom or semi-custom integrated circuit more easily than through original (custom) design. Cell libraries provide the building blocks from which designers create ASICs (application-specific integrated circuits).

standard component—A component that is regularly produced by some manufacturer and is carried in stock by one or more distributors.

standard deflection—1. In a galvanometer having an attached scale, one scale division. 2. In a galvanometer

stand-alone system — standard luminosity curve



Standard cell.

without an attached scale, 1 millimeter when the scale distance is 1 meter.

standard deviation—1. A measure of the variation of data from the average. It is equal to the root mean square of the individual deviations from the average. 2. A measure of dispersion of data or of a variable. The standard deviation is computed by finding the difference between the average and actual observations, squaring each difference, summing the squared differences, finding the average squared difference (called the variance), and then taking the square root of the variance. 3. A statistical measure used most often when analyzing experimental data. The standard deviation of a set of data is the measure of the dispersion of data values about the mean.

standard electrode potential—An equilibrium electrode potential for an electrode in contact with an electrolyte in which all of the components of a specified chemical reaction are in their standard states. The standard state for an ionic constituent is unit ion activity.

standard error—Applied to statistics such as the mean to provide a distribution within which samples of the statistics are expected to fall.

standard eye—An observer that has red and infrared luminosity functions.

standard facility—In programming actions, a basic communications electronics functional entity that is engineered to satisfy a specific communications electronics operational requirement. An associated standard facility equipment list describes the facility functionally and indicates the material required for the standard facility.

standard-frequency service—A radiocommunication service that transmits for general reception specified standard frequencies of known high accuracy.

standard-frequency signal—One of the highly accurate signals broadcast by the National Bureau of Standards radio station WWV on 2.5, 5, 10, 15, 20, and 25 MHz.

standard-gain horn—A waveguide device that has essentially flared out its waveguide dimensions to specific lengths that match (with certain gain) the incoming energy to the atmosphere. The applications include using these horns for reflectors and lenses, pickup horns for sampling power, and receiving and transmitting antennas.

standardization—The process of establishing by common agreement engineering criteria, terms, principles, practices, materials, items, processes, equipment, parts, subassemblies, and assemblies to achieve the greatest practicable uniformity of items of supply and engineering practices, to ensure the minimum feasible variety of such items and practices, and to effect optimum interchangeability of equipment parts and components.

standard luminosity curve—An empirically derived function that describes the response of the eye to radiation of different wavelengths. (The terms luminous

and illumination indicate that this function is taken into account.)

standard microphone—A microphone whose response is known for the condition under which it is to be used.

standard noise temperature—A standard reference temperature (T) for noise measurements, taken as 290 K.

standard observer—A hypothetical observer who requires standard amounts of primaries in a color mixture to match every color.

standard pitch—The tone A at 440 hertz.

standard play—An arbitrary description given to identify a spool of "thick" recording tape with a specified playing time according to reel size. For example, a 7-inch (17.8-cm) spool will hold 1200 ft (366 m) of standard-play tape; a 5-inch (12.7-cm) spool will hold 600 ft (182 m). The actual playing time is then dependent on tape speed.

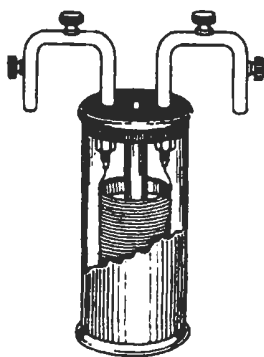
standard propagation—Propagation of radio waves over a smooth, spherical earth of uniform dielectric constant and conductivity, under standard atmospheric refraction.

standard reference temperature—In a thermistor, the body temperature for which the nominal zero-power resistance is specified.

standard refraction—The refraction that would occur in an idealized atmosphere; the index of refraction decreases uniformly with height at the rate of 39×10^{-6} per Kilometer.

standard register of a motor meter—Also called a dial register. A four- or five-dial register, each dial being divided into ten equal parts numbered from 0 to 9. The dial pointers are geared so that adjacent ones move in opposite directions at a 10-to-1 ratio.

standard resistor—Also called a resistance standard. A resistor that is adjusted to a specified value, is only slightly affected by variations in temperature, and is substantially constant over long periods of time.



Standard resistor.

standard rod gap—A gap between the ends of two half-inch square rods. Each rod is cut off squarely and mounted on supports so that it overhangs the inner edge of each support by a length equal to or greater than half the gap spacing. It is used for approximate measurements of crest voltages.

standard seawater conditions—Seawater with a static pressure of 1 atmosphere, a temperature of 15°C, and a salinity such that the velocity of sound propagation is exactly 1500 meters per second.

standard source—In fiber optics, the reference optical power source to which emitting and detecting devices are compared for calibration purposes.

standard sphere gap—A gap between two metal spheres of standard dimensions. It is used for measuring the crest value of a voltage by observing the maximum gap spacing at which sparkover occurs when a voltage is applied under known atmospheric conditions.

standard subroutine—In a computer, a subroutine that is applicable to a class of problems.

standard television signal—A signal that conforms to accepted specification.

standard test conditions—The environmental conditions under which measurements should be made when disagreement of data obtained by various observers at different times and places may result from making measurements under other conditions

standard test-tone power—One milliwatt (0 dBm) at 1000 hertz.

standard voltage generator—See signal generator, 1.

standard volume indicator—A volume indicator with the characteristics prescribed by the American Standards Association.

standby—1. The condition of equipment that will permit complete resumption of stable operation within a short period of time. 2. A duplicate set of equipment to be used if the primary unit becomes unusable because of malfunction.

standby battery—A storage battery held in reserve to serve as an emergency power source in event the regular power facilities at a radio station, hospital, etc., fail.

standby power generator—An alternating-current generator, held in reserve and used to supply the necessary ac power requirements when there is failure of commercially supplied ac power.

standby power supply—Equipment that supplies power to a system in the event the primary power is lost. It may consist of batteries, charging circuits, auxiliary motor generators, or a combination of these devices.

standby redundancy—That redundancy wherein the alternative means of performing the function is inoperative until needed and is switched upon failure of the primary means of performing the function.

standby register—A register in which accepted or verified information can be stored to be available for a rerun in the event of a mistake in the program or a malfunction in the computer.

standby transmitter—A transmitter installed and maintained ready for use whenever the main transmitter is out of service.

standing current—The current present in a circuit in the absence of signal.

standing-on-nines carry—A system of executing the carry process in a computer. If a carry into a given place produces a carry from there, the incoming carry information is routed around that place.

standing wave—Also called stationary wave. 1. The distribution of current and voltage on a transmission line formed by two sets of waves traveling in opposite directions, and characterized by the presence of a number of points of successive maxima and minima in the distribution curves. At points where the voltages of the two waves add, there will be a voltage antinode; at points where the voltages subtract, there will be a voltage node. The nodes and antinodes do not move, and the resultant wave is called a standing wave. 2. The combination of two waves having the same frequency and amplitude and traveling in opposite directions. Standing waves are indicated by a stationary set of nodes spaced

one-half wavelength apart along the propagation direction of the waves. The modes of optical resonators are standing waves produced as the radiation travels back and forth between highly reflecting walls.

standing-wave detector—See standing-wave meter.

standing-wave indicator—See standing-wave meter.

standing-wave loss factor—Ratio of the transmission loss in a waveguide when it is unmatched compared with the loss when it is matched.

standing-wave meter—Also called a standing-wave indicator or detector. An instrument for measuring the standing-wave ratio in a transmission line. It may also include means for finding the location of maximum and minimum amplitudes.

standing-wave ratio—Abbreviated SWR. The ratio of current (or voltage) at a loop (maximum) in the transmission line to the value at a (minimum) node. It is equal to the ratio of the characteristic impedance of the line to the impedance of the load connected to the output end of the line.

standing-wave-ratio bridge—Abbreviated SWR bridge. A bridge for measuring the standing-wave ratio on a transmission line to check the impedance match.

standing waves—The behavior of air pressure waves in an enclosed room or box, giving rise to resonances that occur. They are created by the effects of multiple sound reflections between opposite walls, and cycle at frequencies determined by the distance between them. In effect, the room acts as a resonator.

standoff insulator—1. An insulator used to hold a wire or other radio component away from the structure on which it is mounted. 2. An insulator used to support a high-voltage lead, such as an antenna feeder, at some distance from the mounting surface.

star chain—A group of navigational radio transmitting stations comprising a master station about which three or more slave stations are symmetrically located.

star-connected circuit—A polyphase circuit in which all current paths within the region that limits the circuit extend from each of the points of entry of the phase conductors to a common conductor (which may be the neutral conductor).

star connection—See wye connection.

Stark effect—The splitting or shifting of spectral lines or energy levels due to an applied electric field.

starlight—A scene illumination of 1/10,000 of a footcandle.

star network—A set of three or more branches with one terminal of each connected at a common node.

star-quad cable—Four wires laid together and twisted as a group.

start bit—In asynchronous transmission, the first bit used to indicate the beginning of a character; normally, a space condition that serves to prepare the receiving equipment for the reception and registration of the character.

start dialing signal—A signal transmitted from the incoming end of a circuit, after receipt of a seizing signal, to indicate that the circuit conditions necessary for receiving the numerical routine information have been established.

start element—In certain serial transmissions, the initial element of a character, used for the purposes of synchronization. In Baudot teletypewriter operation, the start element is one space bit.

starter—1. An auxiliary electrode used to initiate conduction in a glow-discharge cold-cathode tube. 2. Sometimes referred to as a trigger electrode. A control electrode whose principal function is to establish sufficient ionization to reduce the anode breakdown voltage

in a gas tube. 3. An electric controller for accelerating a motor from rest to normal speed.

starter breakdown voltage—The voltage required to initiate conduction across the starter gap of a glow-discharge cold-cathode tube, all other tube elements being held at cathode potential before breakdown.

starter gap—The conduction path between a starter and the other electrode to which the starting voltage is applied in a glow-discharge cold-cathode tube.

starter voltage drop—The voltage drop across the starter gap after conduction is established there in a glow-discharge cold-cathode tube.

starting anode—The anode that establishes the initial arc in a mercury-arc rectifier tube.

starting circuit breaker—A device whose principal function is to connect a machine to its source of starting voltage.

starting current of an oscillator—The value of oscillator current at which self-sustaining oscillations will start under specified loading.

starting electrode—The electrode that establishes the cathode spot in a pool-cathode tube.

starting reactor—A reactor for decreasing the starting current of a machine or device.

starting torque—Also called pull-in torque. 1. The maximum load torque with which motors can start and come to synchronous speed. 2. The torque necessary to initiate motion of a system.

starting voltage—The voltage necessary for a gaseous voltage regulator to become ionized or to start conducting. As soon as this happens, the voltage drops to the operating value.

start lead—Also called inside lead. The inner termination of a winding.

startover—A program function that causes an inactive computer to become active.

start-record signal—In facsimile transmission, the signal that starts the converting of the electrical signal to an image on the record sheet.

start signal—The signal that converts facsimile-transmission equipment from standby to active.

start-stop multivibrator—See monostable multivibrator; flip-flop multivibrator.

start-stop system—A system in which each group of code elements that represents an alphabetical signal is preceded by a start signal and followed by a stop signal. The start signal prepares the receiving mechanism to receive and register the character. The stop signal causes the receiving mechanism to come to rest in preparation for reception of the next character.

start-stop transmission—The method of transmission used in a start-stop system.

start-up—The time between equipment installation and the full operation of the system.

start-without-error rate—Stepping rate at which a stepper motor with no external load inertia can start and stop without losing a step.

start-without error torque—Also called pull-in torque. Force moment produced by a stepper motor when started at a fixed frequency or step rate.

starved amplifier—An amplifier employing pentode tubes in which the screen voltage is set 10 percent below the plate voltage and the plate-load resistance is increased to 10 times the normal value. Thus, the amplification factor is greatly increased—often a stage gain of 2000 is achieved.

stat—A prefix used to identify electrostatic units in the cgs system. See also statampere; statcoulomb; statfarad; stathenry; statmho; statohm; statvolt.

statampere—The cgs electrostatic unit of electric current, equal to 3.3356×10^{-10} ampere (absolute).

statcoulomb—The cgs electrostatic unit of charge, equal to 3.3356×10^{-10} coulomb (absolute).

state—1. The condition of a circuit, system, etc. 2. The condition at the output of a circuit that represents logical 0 or logical 1. 3. A condition or set of conditions considered together, especially one of the two normal sets of operating conditions of a gate or flip-flop. 4. The logical 0 or 1 condition in PC memory or at a circuit's input or output.

state code—A coded indication of what state the CPU is in—responding to an interrupt, servicing a DMA request, executing an I/O instruction, etc.

state diagram—A representation of the stable states of a process, and the vectored paths by which the process passes to and from these states.

state machine—A sequential-logic system whose outputs depend on previous and present inputs (for example, a counter), as opposed to processes that are functions of present inputs alone.

statement—In computer programming, a meaningful expression or generalized instruction written in a source language.

state of charge—The condition of a storage cell or battery in terms of the remaining capacity.

state table—Also called state transition table. A list of the outputs of a logic circuit based on the inputs and previous outputs. Such a circuit has memory and cannot be described by a simple truth table.

state transition table—See state table.

statfarad—The cgs electrostatic unit of capacitance, equal to 1.11263×10^{-12} farad (absolute).

stathenry—The cgs electrostatic unit of inductance, equal to 8.98766×10^{-11} henrys (absolute).

static—1. See atmospherics. 2. A form of information storage in shift registers and memories whereby information will be retained as long as power is applied. 3. Capable of maintaining the same state indefinitely (with power applied) without any change of condition. Not requiring a continuous refreshing. 4. A state in which a quantity does not change appreciably within an arbitrarily long time interval. 5. In burn-in, the quality of a test wherein the device is subject to either forward or reverse bias applied to appropriate terminals; voltages are unvarying throughout test.

statically balanced arm—A type of tonearm whose masses are first balanced about the pivot, then deliberately unbalanced by approximately 1 gram in order to provide the required tracking force.

static analysis—Examination of a program (usually via computer) for errors and inconsistencies, without actual execution.

static behavior—The behavior of a control system or an individual unit under fixed conditions (as contrasted to dynamic behavior, under changing conditions).

static breakdown voltage—The voltage at which a transient suppressor begins to conduct when subjected to slow-rising dc. Does not account for transient rise-time rates.

static burn-in—High-temperature test with device subjected to unvarying voltage rather than to operating conditions; either forward or reverse bias.

static cell—A memory cell; basically a cross-coupled flip-flop. Some power is consumed at all times through the two loads. Some newer designs reduce the power required to maintain the state of the flip-flop by using high-resistance polysilicon load resistors.

static characteristic—The relationship between a pair of variables such as electrode voltage and electrode

current, all other voltages being maintained constant. This relationship is usually represented by a graph.

static charge—1. The accumulated electric charge on an object. 2. An electric charge held on the surface of an object.

static check—Of a computer, consists of one or more tests of computing elements, their interconnections, or both, performed under static conditions.

static control—A control system in which control functions are performed by solid-state devices.

static convergence—Convergence of the three electron beams at the center of the aperture mask in a color picture tube. The term *static* applies to the theoretical paths the beams would follow if no scanning forces were present.

static decay—In a storage tube, decay that is a function only of storage surface properties, such as lateral or transverse leakage.

static detector—A device used to detect presence of static charges of electricity, which could cause explosions in hazardous atmospheres.

static device—As associated with electronic and other control or information-handling circuits, the term static refers to devices with switching functions that have no moving parts.

static dump—In a computer, a dump performed at a particular time with respect to a machine run, often at the end of the run.

static electricity—Stationary electricity—i.e., in the form of a charge in equilibrium, or considered independently of the effects of its motion.

static electrode potential—The electrode potential measured when there is no net current between the electrode and electrolyte.

static eliminator—1. A device for reducing atmospheric static interference in a radio receiver. 2. One of a broad range of devices that neutralize nonconductive materials by producing a region of ionized air through which the charged material can pass. Induction static bars consist of a row of grounded metallic points or tufts placed as close as possible to the moving material without touching it. Radioactive static bars employ a coating of radioactive substance facing toward the material to be discharged at a distance of about 1 inch. Electrical static bars have a series of points maintained at high voltage, most frequently capacitively coupled to the voltage source so that they are shock-free even when touched. A small power unit energizes the electrical bars, which are about 1 inch (2.54 cm) from the moving material. Ionizing air guns and blowers also neutralize static. See antistatic sprays.

static error—An error that does not depend on the time-varying nature of a variable.

static field—A field that is present between the poles of either a permanent magnet or an electromagnet that has a direct current passing through its coils.

static focus—The focus attained when the electron beam is theoretically at rest or is at the position it would occupy if scanning energy were not applied.

static forward-current transfer ratio—In a transistor, the ratio, under specified test conditions, of the dc output current to the dc input current.

static input resistance—In a transistor, the ratio of the dc input voltage to the dc input current.

staticize—1. In a computer, to perform a conversion of serial or time-dependent parallel data into a static form. 2. Occasionally, to retrieve an instruction and its operands from storage prior to executing the instruction.

staticizer—A storage device that is able to take information sequentially in time and put it out in parallel.

static line regulation—The output voltage variation of a power supply as the line voltage is varied slowly from rated minimum to rated maximum, with the load current held at the nominal value.

static load regulation—The output voltage variation of a power supply as load current is varied slowly from 0 to 100 percent of rating, with the input line voltage held at the nominal value.

static machine—A machine for generating an electric charge, usually by induction.

static measurement—A measurement taken under conditions in which neither the stimulus nor the environmental conditions fluctuate.

static memory—1. A type of semiconductor memory in which the basic storage element can be set to either of two states, in which it will remain so long as the power stays on. *See also* dynamic memory. 2. A type of semiconductor read/write random-access memory that does not require periodic refresh cycles. 3. An MOS memory that uses a flip-flop as a storage element. It does not need to be refreshed, does not require a clock, and does not lose its contents as long as power is applied.

static MOS array—A circuit made up of MOS devices that does not require a clock signal.

static noise—Noise resulting from lightning, aurora, or other atmospheric discharges.

static power conversion equipment—Any equipment that converts electrical power from one form to another without the use of moving parts such as rotors or vibrators. *Static* implies the use of semiconductors.

static pressure—Also called hydrostatic pressure. The pressure that would exist at a certain point in a medium with no sound waves present. In acoustics, the commonly used unit is the microbar.

static printout—In a computer, a printout of data that is not one of the sequential operations and occurs after conclusion of the machine run.

static RAM—Memory that does not require refreshing because of the cell circuit design although it is still volatile, losing data on removal of power. SRAM is more expensive than DRAM, but is faster and requires less control circuitry.

static register—A computer register that retains its information in static form.

static regulator—A transmission regulator in which the adjusting mechanism is in self-equilibrium at any setting, and control power must be applied to change the setting.

static sensitivity—In phototubes, the direct anode current divided by the incident radiant flux of constant value.

static shift register—A shift register in which logic flip-flops are used for storage. This technique, in integrated form, results in greater storage-cell size and consequently in shorter shift-register lengths. Its primary advantage is that information is retained as long as power is supplied to the device. A minimum clock rate is not required, and, in fact, the device can be unlocked.

static skew—1. A measure of the distance that the output from one track is ahead or behind (i.e., leading or lagging) the output of another track as a tape is transported over the read head. 2. The long-term or average misalignment of a drive's read head as referenced to a master skew tape. Results from gap scatter and misadjustment.

static storage—In computers, storage in which the information does not change position (e.g., electrostatic storage, flip-flop storage, binary magnetic-core storage, etc.). The opposite of dynamic storage.

static subroutine—A digital-computer subroutine involving no parameters other than the address of the operands.

static switch—A semiconductor switching device in which there are no moving parts.

static torque—*See* locked-rotor torque.

static transconductance—In a transistor, the ratio of the dc output current to the dc input voltage.

station—1. One or more transmitters, receivers, and accessory equipment required to carry on a definite radiocommunication service. The station assumes the classification of the service in which it operates. 2. An input or output point in a communications system, such as the telephone set in a telephone system or the point at which a business machine interfaces the channel on a leased private line.

stationarity—The absence of variations with time in the special intensity and amplitude distribution of random noise.

stationary appliance—An appliance that is not easily moved from one place to another in normal use.

stationary battery—A storage battery designed for service in a permanent location.

stationary contacts—Those members of contact pairs that are not moved directly by the actuating system.

stationary field—A constant field—i.e., one in which the scalar (or vector) at any point does not change during the time interval under consideration.

stationary wave—*See* standing wave.

station authentication—Security measure designed to establish the authenticity of a transmitting or receiving station.

station battery—The electrical power source for signaling in telegraphy.

station break—1. A cue given by the station originating a program, to notify network stations that they may identify themselves to their audiences, broadcast local items, etc. 2. The actual time taken in (1) above.

station license—The instrument of authorization for a radio station in the amateur radio service.

station-to-station call—A telephone call in which the calling party does not specify that he or she wishes to reach a particular person at the called point.

statistical multiplexer—*See* ITDM.

statistical multiplexing—Multiplexing by providing bandwidth on the multiplexed data line only for those channels that have data available for transmission. No bandwidth is wasted on terminals that are not sending data.

statmho—The cgs electrostatic unit of conductance, equal to 1.11263×10^{-12} mho (absolute).

statohm—The cgs electrostatic unit of resistance, equal to 8.98766×10^{-11} ohms (absolute).

stator—1. The nonrotating part of the magnetic structure in an induction motor. It usually contains the primary winding. 2. The stationary plates of a variable capacitor. 3. The conducting surfaces of a switch. Similar to the commutator in electrical rotating mechanisms.

stator of an induction watt-hour meter—A voltage circuit, one or more current circuits, and a magnetic circuit combined so that the reaction with currents induced in an individual, or a common, conducting disc exerts a driving torque on the rotor.

stator plates—The fixed plates of a variable capacitor.

status—The present condition of a device. Usually indicated by flag flip-flops or special registers. *See* flag.

status line—A simple method of representing some state of a device in an interconnection scheme.

status register—Register used in a computer to hold status information inside a functional unit, such as an MPU, a PIC, a DMAC, or an FDC. A typical MPU's status register provides carry, overflow, sign ("negative"), zero, and interrupt. It could also include parity, enable (interrupts), or mask.

status word register—A group of binary numbers that informs the user of the present condition of the microprocessor.

statvolt—The cgs electrostatic unit of voltage, equal to 299.796 volts (absolute).

stave—One of the number of individual longitudinal elements that comprise a sonar transducer.

stay cord—A component of a cable, usually a high-tensile textile, used to anchor the cable ends at their points of termination to keep any pull on the cable from being transferred to the electrical connection.

steady state—1. A condition in which circuit values remain essentially constant, occurring after all initial transients or fluctuating conditions have settled down. 2. A term used to specify the current through a load or electric circuit after the inrush current is complete. A stable run condition. 3. A characteristic of a condition exhibiting only minor change over an arbitrarily long period.

steady-state deviation—The difference between the final value assumed by a specified variable after the expiration of transients and its ideal value.

steady-state oscillation—Also called steady-state vibration. Oscillation in which the motion at each point is a periodic quantity.

steady-state regulation—Slow changes in the output voltage of a power supply following an input-voltage and/or load-impedance variation; it is usually expressed in volts (ΔV) or as a percentage of the nominal output.

steady-state value—The value of a current or voltage after all transients have decayed to negligible values.

steady-state vibration—*See* steady-state oscillation.

sealite—A ceramic consisting chiefly of a silicate of magnesium. Because of its excellent insulating properties—even at high frequencies—it is used extensively in insulators and as a circuit substrate.

steer—To adjust by electrical means the polar response pattern of an antenna or the direction of current in a circuit.

steerable antenna—1. An antenna whose major lobe can be readily shifted in direction. 2. A multielement antenna in which the phase relationship between the elements is electronically adjustable. Thus, the antenna beam can be steered in direction and adjusted for beam width.

Stefan-Boltzmann constant— $1.38 \times 10^{-23} \text{ J} \cdot \text{K}^{-1}$. The constant of proportionality between blackbody radiated power and temperature.

Stefan-Boltzmann law—The total emitted radiant energy per unit of a blackbody is proportionate to the fourth power of its absolute temperature.

Steinmetz coefficient—A factor by which the 1.6 power of the magnetic flux density must be multiplied to give the approximate hysteresis loss of an iron or steel sample in ergs per cubic centimeter per cycle when that sample is undergoing successive magnetization cycles having the same maximum flux density.

stenode circuit—A superheterodyne receiving circuit in which a piezoelectric unit is used in the intermediate-frequency amplifier to balance out all frequencies except signals at the crystal frequency, thereby giving very high selectivity.

step—To use the step-and-repeat method.

step and repeat—1. A method of dimensionally positioning multiples of the same or intermixed functional patterns on a given area of a photoplate or a film by repetitions, or contact or projection printing of a single original pattern of each type. 2. A method of positioning multiples of the same pattern on a mask or wafer. 3. A process wherein the conductor or resistor pattern is repeated many times in evenly spaced rows onto a single film or substrate.

step-and-repeat camera—A type of camera that has scales or other arrangements by which successive exposures can be lined up and equally spaced on a sheet of film. It is used in manufacturing microcircuits.

step-and-repeat fix technique—A mechanical technique that provides for linear indexing of a movable platform carrying a wafer or photographic plate. Applications of this technique are in the testing of a device wafer, and in the masking operation that is part of the process of fabricating microelectronic devices.

step-and-repeat printer—A projection printer that is capable of reproducing a multiplicity of images from a master transparency on a single support coated with a photosensitive layer by indexing the receiving material from position to position. Such accessories or attachments find use in microcircuit production.

step angle—Also called increment. The nominal angle through which the rotor shaft of a stepper motor moves between adjacent step positions. The angle is specified in degrees. For a 200-step per revolution motor, the step angle is 1.8° .

step-by-step automatic telephone system—A switching system that employs successive step-by-step selector switches that are actuated by current impulses from a telephone dial.

step-by-step switch—A bank-and-wiper switch in which the wipers are moved by individual electromagnetic ratchets.

step calibration—Also called interval calibration. Often confused with sense step, that is, the application of a calibration resistor to produce a deliberate electrical unbalance.

step counter—In a computer, a counter used in the arithmetical unit to count the steps in multiplication, division, and shift operations.

step down—To decrease the value of some electrical quantity, such as a voltage.

step-down transformer—A transformer in which the voltage is reduced as the energy is transferred from its primary to its secondary winding.

step fiber—A glass optical fiber that has a core of uniform optical density. That is, there is a step function change between the optical density of the cladding and the optical density of the core. When attenuation of signal was the primary practical problem, step fiber was acceptable, and still is acceptable, for limited information rate application.

step function—1. A signal characterized by instantaneous changes between amplitude levels. The term usually refers to a rectangular-front waveform used for making tests of transient response. 2. An essentially nonperiodic waveform that has a transition from one voltage level to another, the time of which is negligible compared with the total duration of the waveform.

step-function response—*See* transient response, 2.

step generator—A device for testing the linearity of an amplifier. A step wave is applied to the amplifier input and the step waveform observed, on an oscilloscope, at the output.

step input—A sudden but sustained change in an input signal.

step load change—An instantaneous change in the magnitude of the load current.

stepped index fiber—1. A fiber composed of a core glass of one index of refraction and a different cladding material of a lower index of refraction. The fiber is characterized by a sharp change in index of refraction at the interface of the two materials. 2. An optical fiber that confines most photons to the fiber's core because they ricochet off the surface, back toward the center. Since the photons skip from side to side at different angles while other photons are traveling more or less unimpeded straight down the center of the fiber, the photons constituting a piece of a message gradually become more and more scattered and eventually deteriorate into meaningless noise unless picked up, amplified, and retransmitted by repeaters every few hundred yards or so.

stepped oxide—A technique of forming the SiO_2 layer of each electrode in two thicknesses so that a two-level potential well can be formed with one voltage. (MIS technology term.)

stepper—Photo equipment used to transfer a reticle pattern onto a wafer. Because of its limited field of view, low throughput, and high cost, such equipment is usually used only for feature size smaller than 1.5 microns, where resolution and line-width control are critical.

stepper motor—1. A motor whose normal operation consists of discrete angular motions of essentially uniform magnitude, rather than continuous rotation. 2. A digital device that converts electrical pulses into proportionate mechanical movement. Each revolution of the motor shaft is made in a series of discrete identical steps. The design of the motor usually provides for clockwise and/or counterclockwise rotation. (Thus, the stepper is ideally suited for many positional and control applications.) 3. Electromagnetical prime mover that rotates through fixed angles in response to applied pulses. The motor accordingly permits use of digital signals to control mechanical motion or position. In addition, the high holding torque associated with each step permits a stepping motor to replace devices such as brakes and clutches, with a gain in system reliability. 4. A device that converts pulsating direct current into rotary mechanical motion. Each dc pulse rotates the stepper a certain fraction of one revolution. The rotor is magnetically held at its last position. 5. A bidirectional permanent-magnet motor that turns through one angular increment for each pulse applied to it. 6. An electric motor that moves incrementally. 7. A device that translates electrical pulses into precise mechanical movement. The output shaft may deliver rotary or linear motion.

steppers—Specially designed electric motors that revolve from pole to pole under control of sequentially energized field windings. Two principle designs are currently available: variable reluctance and permanent magnet.

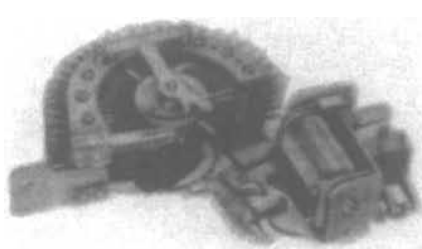
stepping—See zoning, 1.

stepping rate—A measure of stepper motor speed—the number of steps through which the motor rotates in a specified time, usually 1 second.

stepping relay—Also called rotary stepping switch (or relay) or stepping switch. 1. A multiposition relay in which moving wiper contacts mate with successive sets of fixed contacts in a series of steps, moving from one step to the next in successive operations of the relay. 2. A switch that electromechanically steps its wipers across a bank of contacts.

stepping switch—See stepping relay.

step-recovery diode—Also called snap varactor. 1. A varactor in which forward voltage injects carriers



Stepping relay.

across the junction, but before the carriers can combine, the voltage reverses and carriers return to their origin in a group. The result is the abrupt cessation of reverse current and a harmonic-rich waveform. 2. A special form of pn junction in which the charge storage and switching characteristics are optimized for use in microwave-frequency multipliers and comb generators. The device stores charge while in forward conduction, and a large reverse bias current can be obtained until all the charge is removed. The device impedance then goes from a low value to a very high one in transition times as low as 50 picoseconds.

step response—Motor-shaft rotational response of a stepper motor to a step command related to time.

step-servo motor—A device that, when properly energized by dc voltage, indexes in definite angular increments.

steps per revolution—The total number of steps required for the output shaft of a dc stepping motor to rotate 360° , or one complete revolution. Steps per revolution is calculated by dividing the step angle into 360° .

steps per second—The number of angular movements accomplished by the motor of a dc stepping motor in 1 second. This figure replaces the rpm figure of a standard drive motor.

step stress test—A test consisting of several stress levels applied sequentially for periods of equal duration to a sample; during each period a stated stress level is applied, which is increased from one step to the next.

step-strobe marker—A form of strobe marker in which the discontinuity is in the form of a step in the time base.

step up—To increase the value of an electrical quantity, such as a voltage.

step-up transformer—A transformer in which the voltage is increased as the energy is transferred from the primary to the secondary winding.

step voltage—The potential difference between two points on the earth's surface separated by a distance of one pace, or about 3 feet or 91.4 cm, in the direction of maximum potential gradient.

step-voltage regulator—A device consisting of a regulating transformer and a means for adjusting the voltage or the phase relation of the system circuit in steps, usually without interrupting the load.

steradian—1. The unit of solid angular measure, being the subtended surface area of a sphere divided by the square of the sphere's radius. There are 4π steradians in a sphere. The steradian is the unit of solid angular measurement often used in problems of illumination. 2. The solid angle described by a unit area on a sphere from a point source at unity distance and located at the center of the sphere, e.g., 1 sq ft illuminated at a distance of 1 ft.

sterance—Describes the intensity per unit area of a source.

Sterba antenna—A series-fed array of adjacent, broadside-firing, transposed square loops that have half-wave sides and are spaced a distance of approximately one-half wavelength.

Sterba curtain—A stacked dipole antenna array that consists of one or more phased half-wave sections and a quarter-wave section at each end. The array can be oriented for either vertical or horizontal radiation and can be fed at either the center or the end.

stereo—A prefix denoting having or dealing with three dimensions.

stereo—See stereophonic.

stereo adapter—Also called a stereo control unit. A device used with two sets of monophonic equipment to make them act as a single stereo system.

stereo amplifier—An audio-frequency amplifier with two or more channels, for a stereo sound system.

stereo broadcasting—See stereocasting.

stereo cartridge—A phonograph pickup for reproduction of stereophonic recordings. Its high-compliance needle is coupled to two independent voltage-producing elements.

stereocasting—Also called stereo broadcasting. Broadcasting over two sound channels to provide stereo reproduction. This may be done by simulcasting, multicasting, or multiplexing.

stereocephaloid microphone—Two or more microphones arranged to simulate the acoustical patterns of human hearing.

stereo control unit—See stereo adapter.

stereo microphones—Two or more microphones spaced as required for stereo recording.

stereophonic—1. Designating a sound reproduction system in which sound is delivered to the listener through at least two channels, creating the illusion of depth and of locality of source. 2. A two-channel recording and reproduction system more popularly referred to as *stereo*. At the recording studio, separate microphones are used for each recorded channel. The correct reproduction of stereo signals in the home gives to the listener a sense of direction of sound and, thus, realism. 3. A multiple-channel sound system or recording in which each channel carries a unique version of the total original performance. When the channels are blended acoustically, they recreate the breadth and depth of the original, adding a new dimension to reproduced sound. At least two channels are required for playback, although more than two may be used in recording. 4. Using two or more channels to create a spatial effect.

stereophonic reception—Reception involving the use of two receivers having a phase difference in their reproduced sounds. The sense of depth given to the received program is analogous to the listener's being in the same room as the orchestra or other medium.

stereophonic separation—The ratio of the electrical signal caused in the right (or left) stereophonic channel to the electrical signal caused in the left (or right) stereophonic channel by the transmission of only a right (or left) signal.

stereophonic sound system—A sound system with two or more microphones, transmission channels, and speakers arranged to give depth to the reproduced sound.

stereophonic subcarrier—A subcarrier employed in FM stereophonic broadcasting that has a frequency that is the second harmonic of the pilot subcarrier frequency.

stereophonic subchannel—The band of frequencies from 23 to 53 kilohertz containing the stereophonic subcarrier and its associated sidebands.

stereophonic system—A sound-reproducing system in which a plurality of microphones, transmission

channels, and speakers (or earphones) are arranged to afford a listener a sense of the spatial distribution of the sound sources.

stereo pickup—A phonograph pickup used with stereo records, wherein a single stylus actuates two transducer elements, one of which reproduces the left channel and the other the right channel.

stereo recording—The impressing of signals from two channels onto a tape or disc in such a way that the channels are heard separately on playback. The result is a directional, three-dimensional effect.

stereoscope—A small instrument containing a picture support and a pair of magnifying lenses, so arranged that the left eye sees only the picture taken with the left lens of the stereo camera, and the right eye only the right picture. If the camera lenses are separated by the interocular distance, and if the focal lengths of camera and stereoscope lenses are equal, then a true-to-scale, or orthoscopic, reproduction of the scene will be obtained. Stereoscopes are used extensively in photogrammetry for plotting the contour lines in a terrain recorded by aerial photography.

stereoscopic—Imagery giving the illusion of being three-dimensional.

stereoscopic television—A system of television broadcasting in which the images appear to be three-dimensional.

stereo separation—A stereo receiver's ability to keep the audio information in each channel separate from the other.

stereosonic system—A recording technique using two closely spaced directional microphones with their maximum directions of reception 45° from each other. In this way, one picks up sound largely from the right and the other from the left, similar to middle-side recording.

stick—CB radio term for any nondirectional antenna.

stick circuit—A circuit used to maintain energization of a relay or similar unit through its own contacts.

stickiness—The condition of physical interference with the operation of the moving part of an electrical indicating instrument.

sticking—In computers, the tendency of a flip-flop to remain in, or to spontaneously switch to, one of its two stable states.

stiff—A voltage source whose value is largely independent of the current drawn having a relatively low impedance.

stiffness factor—The angular lag between the input and output of a servosystem.

stilb—Abbreviated sb. The unit of luminance (photometric brightness) equal to 1 candela per square centimeter.

still—Photographic or other stationary illustrative material used in a television broadcast.

stimularity—An arbitrary measure of sensitivity to stimulation. It is proportional to the quantum efficiency relative to incident radiation.

stimulated emission—1. The emission of radiation by a system going from an excited electron energy level to a lower energy level under the influence of a radiation field. The emitted radiation is in phase with the stimulating radiation and produces a negative absorption condition. 2. Radiation similar in origin to spontaneous emission, but determined by the presence of other radiation having the same frequency. Since the phase and amplitude of the stimulated wave depend on the stimulating wave, this radiation is coherent with the stimulating wave. The rate of stimulated emission is proportional to the intensity of the stimulating wave. 3. In a laser, the emission of light caused by a signal applied to the laser

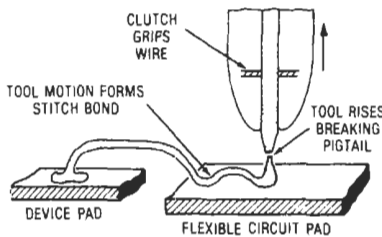
such that the response is directly proportional to, and in phase coherence with, the electromagnetic field.

stimulus—1. *See* excitation, 1. 2. An input parameter to a unit under test, e.g., voltage or current. *See also* measurand.

stirring effect—The circulation in a molten conductive charge due to the combined motor and pinch effects.

stitch bond—1. A wire bond made by laying the wire on the bonding pad and using thermocompression or ultrasonic scrubbing to form the joint. Note that in thermocompression wire bonding, the first termination is a ball bond, while subsequent terminations of the same wire are stitch bonds. 2. A bond made with a capillary-type bonding tool when the wire is not formed into a ball prior to bonding.

stitch bonding—A bonding technique in which wire is fed through a capillary tube. A bent section of the wire is bonded to the contact area by the capillary. The capillary is removed and a cutter severs the wire, forming a new bend for the next bonding operation.



Stitch bonding.

stitching—The process of welding thermoplastic materials by successive applications of two small electrodes that are connected to the output of a radio-frequency generator; a mechanism similar to that of a conventional sewing machine is used.

stitch wire—A semiautomatic system of point-to-point interconnections in which gold-plated steel pins are pressed into holes in conventional printed-circuit boards. Teflon-insulated 30 AWG nickel wire is bonded to the pins. Electronic components are then soldered to terminal projections on the opposite side of the board.

STL—Abbreviation for Schottky transistor logic.

stochastic—The characteristic of events changing the probabilities of various responses.

stochastic process—A random process.

stock reel—Also called supply reel or storage reel. On a tape recorder, the reel from which unrecorded or unplayed tape is taken as the machine records on or plays it.

stoichiometric impurity—A crystalline imperfection caused in a semiconductor by a deviation from the stoichiometric composition.

stopband—That part of the frequency spectrum that is subjected to specified attenuation of signal strength by a filter. (The part of the spectrum between the passband and the stopband is called the transition region.)

stop bit—1. A signal following a character or block that prepares the receiving device to receive the next character or block. 2. In asynchronous transmission, the last bit, used to indicate the end of a character (normally a mark condition) that serves to return the line to its idle or rest state.

stop-copy—*See* copyguard.

stop-cycle timer—A timer that runs through a single cycle and then stops until the starting signal is reinitiated.

stop element—Also called stop signal. In certain types of serial transmission, the last element of a character, used to ensure that the next start element will be recognized.

stop instruction—A machine operation or routine that requires some manual action other than operation of the start key to continue processing.

stop opening—In a camera, the size of the aperture that controls the amount of light passing through the lens.

stopping potential—The voltage required to stop the outward movement of electrons emitted by photoelectric or thermionic action.

stop-record signal—A facsimile signal used for stopping the conversion of the electric signal into an image on the record sheet.

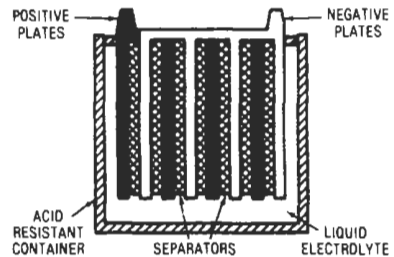
stop signal—The signal that transfers facsimile equipment from active to standby.

storage—1. The act of storing information. *See also* store, 1 and 2. 2. A computer section used primarily for storing information in electrostatic, ferroelectric, magnetic, acoustic, optical, chemical, electronic, electrical, mechanical, etc., form. Such a section is sometimes called a memory, or a store, in British terminology. 3. In an oscilloscope, the ability to retain the image of an electrical event on the cathode-ray tube (CRT) for further analysis after that event ceases to exist. This image retention may be for only a few seconds with variable persistence storage, or it may be for hours with bistable storage. 4. The retention of data so that the data can be obtained at a later time. 5. A computer-oriented medium in which data is retained. Primary storage is the internal storage area where the data and program instructions are retained for active use in the system—normally core storage. Auxiliary or external storage is for less active data. These may include magnetic tape, disk, or drum. 6. Synonymous with memory.

storage access time—In a computer, the time required to transfer information from a storage location to the local storage register or other location, where the information then becomes available for processing.

storage allocation—The assignment of specific sections of computer memory to blocks of data or instructions.

storage battery—Two or more storage cells connected in series and used as a unit.



Storage battery.

storage capacity—1. The amount of information that a storage (memory) device can retain. It is often expressed as the number of words the device can retain (given the number of digits and the base of the standard word). In the case of comparisons among devices that

use different bases and word lengths, the capacity is customarily expressed in bits. For example, a 1 K semiconductor memory can store 1024 bits, a 2 K semiconductor memory can store 2048 bits. Fixed memories usually contain instructions and therefore their capacity is sometimes expressed as the number of words of a certain length that they can hold. For example, 256×4 means that the memory can store 256 four-bit words, which makes it a 1 K memory (1024 bits). The same 1 K memory could be a 128×8 memory. 2. The number of items of data that a storage device is capable of containing. Frequently defined in terms of computer words, or by a specific number of bytes or characters.

storage cell — 1. Also called a secondary cell. A cell that, after being discharged, can be recharged by sending an electric current through it in the opposite direction from the discharging current. 2. An elementary unit of storage (e.g., binary cell, decimal cell). 3. A cell that converts chemical energy into electrical energy by a reversible chemical reaction and that may be recharged by passing a current through it in the direction opposite to that of its discharge.

storage counter — A counter in which a series of current pulses charge a capacitor, with each pulse raising the voltage to a higher level. A comparator circuit determines when the capacitor voltage reaches a predetermined level. Special techniques are frequently used to linearize the charging curve of the capacitor.

storage CRT — A CRT that can retain a visual image for some length of time so that it is not necessary to refresh to avoid flicker. Thus, the picture can be written at a slower rate. The absence of refresh eliminates the refresh memory and reduces display-deflection and video-bandwidth requirements. The resultant system is available at a price less than that of most other systems. However, it does have deficiencies, such as low luminance and contrast and the need to rewrite an entire picture if any element is changed.

storage cycle — 1. The periodic sequence of events that occur when information is transferred to or from a computer storage device. 2. Storing, sensing, and regeneration from parts of the storage sequence.

storage device — 1. A device into which data can be inserted, in which it can be retained, and from which it can be retrieved. 2. A device used for storing data within a computer system, e.g., core storage, magnetic disk unit, magnetic tape unit, etc.

storage element — 1. An area that retains information distinguishable from that of adjacent areas on the storage area of charge-storage tubes. 2. The smallest part of a digital-computer storage facility, used for storage of a single bit.

storage integrator — In an analog computer, an integrator used to store a voltage in the hold condition for future use while the rest of the computer assumes another computer control state.

storage key — In a computer, an indicator that is associated with a storage block or blocks and that requires tasks to have a matching protection key in order to use the blocks.

storage laser — Any laser that stores unusually high energy prior to discharge. For example, a storage diode laser is a laser in which some carriers are electrically excited for a time longer than the lasing period.

storage life — Also called shelf life. 1. The minimum length of time over which a device, system, or transducer can be exposed to specified environmental storage conditions without changing the performance beyond a specified tolerance. 2. The period during which a battery can be stored and remain suitable for use. 3. The length

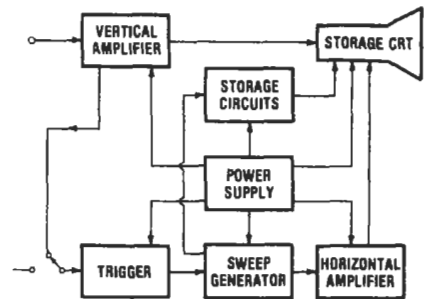
of time an item can be stored under specified conditions and still meet specified requirements.

storage location — 1. A computer storage position that holds one machine word and usually has a specific address. 2. A position in storage where a character, byte, or word may be stored.

storage medium — Any recording device or medium into which data can be copied and held until some later date, and from which the entire original data can be obtained.

storage node — Also called a storage electrode. The structure in a DRAM cell on which the cell's charge is stored.

storage oscilloscope — 1. An instrument that has the ability to store a CRT display in order that it may be observed for any required time. This stored display may be instantly erased to make way for storage of a later event. 2. An oscilloscope used as the output device of analog and digital computers or in the analysis of nonperiodic events and the monitoring of slow signals.



Storage oscilloscope.

storage print — In computers, a utility program that causes the requested core image, core memory, or drum locations to be recorded in either absolute or symbolic form on either the line printer or the delayed printer tape.

storage protection — Also called memory protection. In a computer, an arrangement by which access to storage is prevented for reading, writing, or both.

storage register — A collection of electronic circuits that allows data (usually one or more computer words) to be stored until needed.

storage surface — The part of an electrostatic storage tube on which storage of information takes place.

storage temperature — The temperature of the medium immediately adjacent to the device at which the device, without power applied, may be stored indefinitely without deterioration.

storage time — 1. The time during which the output current or voltage of a pulse is falling from maximum to zero after the input current or voltage has been removed. 2. An increase in the time needed to turn off a transistor that has been driven into saturation. It results from the fact that a transistor in heavy conduction has many excess charge carriers moving in the collector region. When the base signal is changed to the cutoff level, collector current continues until all the excess charge carriers have been removed from the collector region.

storage tube — 1. An electron tube into which information can be stored and later read out, usually a cathode ray tube with a storage screen that will retain charges impressed on it and that can control an electron beam in some way, allowing changes to be read out. 2. A CRT

that stores images on a separate storage screen behind the viewing screen in the tube. Images then remain on the viewing screen until the storage screen is erased. Since a storage tube does not have to be refreshed, it can display an extremely large amount of data without flicker. 3. A cathode-ray tube combined with an electrostatic storage unit that is used to introduce, store, and retrieve information translated into electric charge form. 4. A CRT that retains an image for a considerable period without redrawing.

store—1. To retain information in a device from which the information can later be withdrawn. 2. To introduce information into the device in (1) above. 3. A British synonym for storage. *See* storage, 2.

store and forward—1. A data communications technique that accepts packets, stores them until they are validated and complete, and then forwards them to the next node on the packet path. 2. Process of message handling used in a message-switching system. 3. Communications system in which messages received at intermediate routing points are recorded for later retransmission to a further routing point or the ultimate recipient.

stored energy—The amount of energy stored in the primary of an electronic ignition system. In an inductive system the stored energy is

$$W_p = 1/2LI^2$$

where

W_p = energy stored in the primary field, in joules

L = primary inductance, in henrys

I = current in the primary winding, in amperes

In a capacitor discharge system,

$$W_p = 1/2CE^2$$

where

W_p = energy stored in the primary capacitor, in joules

C = primary capacitance, in farads

E = peak primary voltage, in volts

stored-energy welding—A method of welding in which electric energy is accumulated (stored) electrostatically, electromagnetically, or electrochemically at a relatively slow rate and is then released at the required rate for welding.

stored program—A set of instructions in the computer memory specifying the operations to be performed and the location of the data on which these operations are to be performed.

stored-program computer—Also called general-purpose computer. 1. A computer in which the instructions specifying the program to be performed are stored in the memory section along with the data to be operated on. 2. A digital computer that, under control of its own instructions, can synthesize, and sometimes alter, stored instructions as though they were data and can subsequently execute these new instructions.

stored program logic—A program stored in a memory unit containing logical commands to the remainder of the memory so that the same processes are performed on all problems.

stored-response testing—Comparison of the actual output responses of the device under test with the expected correct output responses stored within the tester. The expected correct responses can be recorded from a known-good device or determined by manual analysis or software simulation. Stored-response testing often implies storage of the actual logic states, although such digital signatures as transition counts could be the stored responses.

stored routine—In computers, a series of stored instructions for directing the step-by-step operation of the machine.

stored writing rate (of a storage oscilloscope)—The highest rate of spot movement that will leave behind a stored image on the face of the cathode-ray tube. Faster spot movement will not leave an image, as in step-response displays with no vertical edges or sine-wave displays with the zero-crossing edges missing.

store transmission bridge—A transmission bridge that consists of four identical impedance coils (the two windings of the back-bridge relay and the live relay of a connector, respectively) separated by two capacitors. It couples the calling and called telephones together electrostatically for the transmission of voice-frequency (alternating) currents, but separates the two lines for the transmission of direct current for talking purposes (talking current).

storm loading—The mechanical loading imposed on the components of a pole line by wind, ice, etc., and by the weight of the components themselves.

straight dipole—A half-wave antenna consisting of one conductor, usually centered.

straightforward circuit—A circuit in which signaling is performed automatically and in one direction.

straightforward trunking—In a manual telephone switchboard system, that method of operation in which one operator gives the order to another operator over the trunk that later carries the conversation.

straight-line capacitance—The variable-capacitor characteristic obtained when the rotor plates are shaped so that the capacitance varies directly with the angle of rotation.

straight-line code—The repetition of a sequence of instructions, with or without address modification, by explicitly writing the instructions for each repetition. Generally straight-line coding will require less execution time and more space than equivalent loop coding. If the number of repetitions is large, this type of coding is tedious unless a generator is used. The feasibility of straight-line coding is limited by the space required as well as the difficulty of coding a variable number of repetitions.

straight-line frequency—The variable-capacitor characteristic obtained when the rotor plates are shaped so that the resonant frequency of the tuned circuit containing the capacitor varies directly with the angle of rotation.

straight-line tracking arm—*See* radial tonearm.

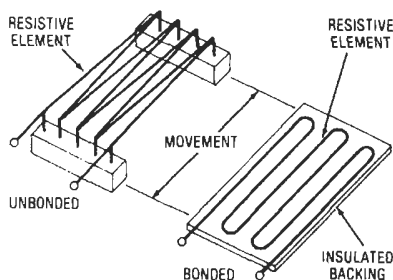
straight-line wavelength—The variable-capacitor characteristic obtained when the rotor plates are shaped so that the wavelength of resonance in the tuned circuit containing the capacitor varies directly with the angle of rotation.

strain—The physical deformation, deflection, or change in length resulting from stress (force per unit area). The magnitude of strain is normally expressed in microinches per inch.

strain anisotropy—A force that directs the magnetization of a particle along a preferred direction relative to the strain.

strain gage—1. A resistive transducer whose electrical output is proportional to the amount it is deformed under strain. 2. A measuring element for converting force, pressure, tension, etc., into an electrical signal. 3. A device for measuring the expansion or contraction of an object under stress, comprising wires that change resistance with expansion or contraction. *See also* load cell. 4. A sensor that produces a voltage or resistance change when a mechanical force is applied.

strain-gage alarm system—An alarm system that detects the stress caused by the weight of an intruder as



Strain gage, 1.

he or she moves about a building. Typical uses include placement of the strain-gage sensor under a floor joist or under a stairway tread.

strain-gage based—An instrument or transducer with a sensing element composed of bonded or unbonded strain gages.

strain-gage sensor—A sensor that, when attached to an object, will provide an electrical response to an applied stress on the object, such as a bending, stretching, or compressive force.

strain-gage transduction—The conversion of the measurand into a change in resistance caused by strain in four or, more rarely, two arms of a Wheatstone bridge.

strain insulator—A single insulator, an insulator string, or two or more strings in parallel designed to transmit the entire pull of the conductor to, and insulate the conductor from, the tower or other support.

strain pickup—A phonograph pickup cartridge using the principle of the strain gage.

strain-sensitive cable—An electrical cable that is designed to produce a signal whenever the cable is strained by a change in applied force. Typical uses including mounting it in a wall to detect an attempted forced entry through the wall, fastening it to a fence to detect climbing on the fence, or burying it around a perimeter to detect walking or driving across the perimeter.

strain wire—Wire having a composition such that it exhibits favorable strain-gage performance. Also the strain-sensitive filaments that constitute the transfer electrical elements in certain transducers.

strand—1. One of the wires or groups of wires of any stranded conductor. 2. A bundle of wires that are twisted together to form a flexible cable capable of withstanding large tensile stress.

stranded conductor—1. A conductor composed of a group of noninsulated wires, usually twisted. 2. *See* stranded wire.

stranded wire—Also called stranded conductor. A conductor composed of a group of wires or any combination of groups of wires. The wires in a stranded conductor are usually twisted or braided together.

stranding—The twisting together of small wires to form a single larger conductor. Used to provide long flexing life, limpness, ease of handling, or vibration resistance.

stranding effect—The property of a stranded conductor to exhibit a higher dc resistance than does a solid conductor of the same material and cross-sectional area. It is due to the relatively longer distance that current must travel when following a stranded conductor's helically configured wires.

strand lay—The distance of advance of one strand of a spirally stranded conductor in one turn, measured axially.

strap—1. A wire or strip connected between the ends of the segments in the anode of a cavity magnetron to promote operation in the desired mode. 2. A bare or insulated conductor run from terminal to terminal of the same or adjacent components. 3. A connecting link or wire between two terminals. 4. To interconnect two or more terminals with strapping wire.

strapping—1. In a multicavity magnetron, the connecting together of resonator segments that have the same polarity, so that undesired modes of oscillation are suppressed. 2. An interconnecting strap or straps.

stratification—The separation of nonvolatile components of a thick film into horizontal layers during firing, due to large differences in density of the component. It is more likely to occur with a glass-containing conductor paste, and under prolonged or repeated firing.

stratosphere—A calm region of the upper atmosphere characterized by little or no temperature change throughout. It is separated from the lower atmosphere (troposphere) by a region called the tropopause.

stray capacitance—1. The capacitance introduced into a circuit by the leads and wires connecting the circuit components. 2. Any of the small unintentional capacitances that exist between wires or components in a circuit, particularly capacitance to ground. 3. The capacitance introduced into a circuit by the relative proximity of cables, wires, components, etc.

stray current—A portion of the total current that flows over paths other than the intended circuit.

stray-current corrosion—Corrosion that results when a direct current from a battery or their external source causes a metal in contact with an electrolyte to become anodic with respect to another metal in contact with the same electrolyte. Accelerated corrosion will occur at the electrode where the current direction is from the metal to the electrolyte and will generally be in proportion to the total current.

stray field—The leakage magnetic flux that spreads outward from an inductor and does no useful work.

stray magnetic field—Stray magnetic flux from nearby transformers or inductors that can link with conductors or other inductors to produce undesired and interfering noise voltages.

strays—*See* atmospherics.

streaking—Distortion in which televised objects appear stretched horizontally beyond their normal boundaries. It is most apparent at the vertical edges, where there is a large transition from black to white or white to black, and is usually expressed as short, medium, or long streaking. Long streaking may extend as far as the right edge of the picture and, in extreme low-frequency distortion, even over a whole line interval.

stream deflection amplifier—A fluidic device that utilizes one or more control streams to deflect power stream, altering the output.

streamer breakdown—Breakdown caused by an increase in the field due to the accumulation of positive ions produced during electron avalanches.

streaming—1. The production of a unidirectional flow of currents in a medium where sound waves are present. 2. A nonstop save-and-restore technique wherein data is transmitted between a tape backup system and Winchester disk in a continuous stream without starting and stopping between data blocks. When all of the data has been transferred, the streaming drive stops. This technology allows for low-cost drives, since the requirement for search and overwrite of a single record is eliminated. A streaming drive does not need high-performance start/stopability, and the expensive servo electronics inherent in that function are also eliminated. 3. A modem's condition when it is sending a carrier

signal on a multidrop communication line and hasn't been polled.

strength of a simple sound source—The rms magnitude of the total air flow at the surface of a simple source in cubic meters per second (or cubic centimeters per second), where a simple source is taken to be a spherical source whose radius is small compared with one-sixth wavelength.

strength of a sound source—The maximum instantaneous rate of volume displacement produced by the source when emitting a sinusoidal wave.

stress—The force producing strain in a solid.

stretched display—A PPI display having the polar plot expanded in one rectangular dimension. The equal-range circles of the normal PPI display become ellipses.

stria—A defect in optical materials, such as glass, plastic, or crystals, consisting of a more or less sharply defined streak of material having a slightly different index of refraction than the main body of the material.

striation technique—Rendering sound waves visible by using their individual ability to refract light waves.

striking an arc—Starting an electric arc by touching two electrodes together momentarily.

striking distance—The effective separation of two conductors having an insulating fluid between them.

striking potential—1. The voltage required to start an electric arc. 2. The lowest grid-to-cathode potential at which plate current begins flowing in a gas-filled triode.

striking voltage—The value of voltage required to start current in a gas tube.

string—1. In a list of items, a group of items that are already in sequence according to a rule. 2. A connected sequence of entities, such as characters, in a command string. 3. A contiguous set of memory addresses each of which contains a single alphanumeric character. Strings are often enclosed in quotes when written in program statements. 4. A line of symbols of indefinite length treated as a single unit. 5. The way a computer sees text. 6. A sequence of characters.

string electrometer—An electrostatic voltage-measuring instrument consisting of a conducting fiber stretched midway between and parallel to two conducting plates. The electrostatic field between the plates displaces the fiber laterally in proportion to the voltage between the plates.

string-shadow instrument—An instrument in which the indicating means is the shadow (projected or viewed through an optical system) of a filamentary conductor whose position in a magnetic or an electric field depends on the measured quantity.

strip—To remove insulation from a wire or cable.

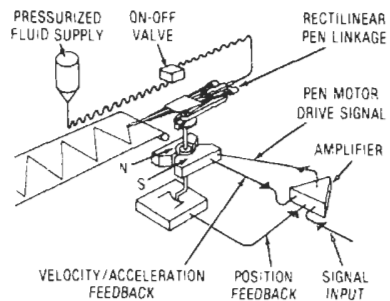
strip chart recorder—1. An instrument for recording variations in the measurement of a quantity over time, using a moving pen on a long strip of paper. 2. Data recorder that provides a record in the form of a graph on a strip of paper. Used to measure parameters whose values do not change rapidly with time (one typical device has a specified response time of 0.25 second, full scale). Strip chart recorders are available in multipen models.

strip contacts—Formed contacts in a continuous length, or strip, for use in an automatic installation machine.

stripping—In flowcharting, the use of a line across the upper portion of a symbol to indicate the presence of a detailed representation elsewhere in the same set of flowcharts.

stripline—1. Also called microstrip. Layout and interconnection method used for circuits that operate at very high frequencies, usually above 1 gigahertz. 2. Strip transmission line. 3. A type of microwave transmission line used in integrated circuits, consisting of a narrow,

strength of a simple sound source — strobe pulse



Strip chart recorder.

flat conductor sandwiched between, and insulated from, wider flat grounded conductors. 4. A type of transmission line configuration that consists of a single narrow conductor parallel and equidistant to two parallel ground planes. 5. A microwave conductor on a substrate.

strip-loaded diffused optical waveguide—A three-dimensional optical waveguide constructed from a two-dimensional diffused optical waveguide on whose surface has been deposited a dielectric strip of a lower refractive index material, thus confining the electromagnetic fields of the propagating mode to the vicinity of the strip, hence achieving a three-dimensional guide.

stripper—A hand-operated or motor-driven tool for removing insulation from wires.

stripping—1. A process using either acids or plasma to remove the resist coating of a wafer after the exposure, development, and etching steps. 2. Removing the insulation from a wire. 3. Removing the outer sheath or covering of a cable or wire, thus exposing the insulated wires.

strip printer—A peripheral device used with a programmable controller to provide a hard copy of process number, status, and functions.

strip transmission line—A microwave transmission line in the form of a thin, narrow rectangular strip adjacent to a wide ground-plane conductor or between two wide ground-plane conductors. Separation of the conductors usually is achieved by using a low-loss dielectric material on which the conductors are formed by etching.

strobe—1. An intensified spot in the sweep of a deflection-type indicator, used as a reference mark for ranging or expanding the presentation. 2. An intensified sweep on a plan-position indicator or B-scope. Such a strobe may result from certain types of interference or it may be purposely applied as a bearing or heading marker. 3. On a console oscilloscope, a line representing the azimuth data generated by a jammed radar site. 4. See electronic flash. 5. An input to a counter or register that permits the asynchronous entry of parallel data. 6. A selection signal that is active when data is correct on a bus. 7. A control signal used to effect information transfers at the hardware level.

strobe hold time—The time necessary to strobe parallel data into a counter or register completely.

strobe marker—A small bright spot, a short gap, or other discontinuity produced on the line trace of a radar display to indicate the part of the time base that is receiving attention.

strobe pulse—Also called sample pulse. 1. A pulse used to gate the output of a core-memory sense amplifier into a trigger in a register. 2. A pulse of duration less than the time period of a recurrent phenomenon, used for making a close investigation of that phenomenon. The frequency of the strobe pulse bears a simple relation to

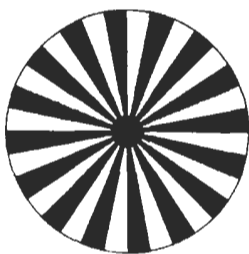
that of the phenomenon, and the relative timing is usually adjustable. 3. A pulse that enables a system for a fixed period only.

strobe release time—The time that must elapse after the strobe input is disabled before a clocking transition will be recognized by a counter.

Strobolume—A trade name used to describe a high-intensity electronic stroboscope manufactured by General Radio Company.

stroboscope—1. A light that flashes at a frequency that can be adjusted to coincide with any repeating motion. When the flashing rate is synchronized with the motion, the moving device appears to be stopped. Since the flashing rate is known, the speed of the device can be determined without physically contacting the device. A flashing rate slightly different from the synchronized rate makes the device appear to operate in slow motion. With the stroboscope, such characteristics of motion as whip, vibration, rotation, or chatter can be observed readily. 2. Device that administers brief flashes of light for the purpose of observing the behavior of an object during a short interval of time. One of the most effective means for accomplishing this purpose is a gaseous tube energized by the discharge of a capacitor. Light flashes as short as 1 microsecond have been produced in this fashion. By illuminating moving machinery with intermittent flashes of light at the correct frequency, the machine can be made to appear stationary; by reducing or increasing the flash rate slightly, the machine will appear to move slowly in the forward or reverse direction. Many turntable platters carry a band of dots or lines around their rims, or on their under surfaces, lit by a neon lamp. When the platter speed is adjusted to exactly $33\frac{1}{3}$ or 45 rpm, the dots or lines appear to stand still.

stroboscopic disc—A printed disc having several rings, each with a different number of dark segments. The pattern is placed on a rotating phonograph turntable and illuminated at a known frequency by a flashing discharge tube. The speed can then readily be determined by noting which pattern appears to stand still or rotate the slowest.



Stroboscopic disc.

stroboscopic light source—An electronic flash tube capable of repeated operation at hundreds or thousands of flashes per second for long periods.

stroboscopic tachometer—A stroboscope with a scale calibrated in flashes or in revolutions per minute. The stroboscopic lamp is directed onto the rotating device being measured, and the flashing rate is adjusted until the device appears to be standing still. The speed can then be read directly from the scale.

strobotron—1. A type of glow lamp that produces intense flashes of light when fed with accurately timed voltage pulses. It is used in electronic stroboscopes for visual inspection of high-speed moving parts. 2. A

specified cold-cathode gas tube used to apply a short-duration, high-power arc for a stroboscope.

stroke—In character recognition, a straight line segment or arc that forms a part of a graphic character.

stroke centerline—In character recognition, a line equidistant from the two stroke edges.

stroke edge—In character recognition, the region of discontinuity between a side of a stroke and the background, determined by averaging, over the length of the stroke, the irregularities produced by the printing and detection processes.

stroke pattern—The pattern, formed by a character-generation CRT system, in which the characters are composed of a sequence of line segments (strokes) generated by the electron beam motion with time intervals between successive coordinates. The characters are formed within a rectangle by different combinations of vertical, horizontal, and diagonal strokes, coupled with intensity control signals.

stroke speed—Also called scanning-line frequency or scanning frequency. The number of times per minute that a fixed line, perpendicular to the direction of scanning, is crossed in one direction by a scanning or recording spot in a facsimile system.

stroke width—In character recognition, the distance, measured in the direction perpendicular to the stroke centerline, between the two edges of a stroke.

structured logic design—A method of describing chip design through a hierarchical structure by which each level of component functions can be described by a lower level of functions.

structured programming—Also called top-down programming. 1. A systematic procedure for writing programs in modular form with a clear logical structure. Such programs are easy to understand and modify. 2. A set of conventions and rules that, when followed, yields programs that are easy to write, test, modify, and read. 3. Techniques concerned with improving the programming process through better organization of programs and better programming notation to facilitate correct and clear description of data and control structures.

stub—1. A short length of transmission line or cable joined as a branch to another transmission line or cable. 2. A short section of transmission line, open or shorted at the far end, connected in parallel with a transmission line to match the impedance of the line to that of an antenna or transmitter.

stub angle—A right-angle elbow for a coaxial rf transmission line, the inner conductor being supported by a quarter-wave stub.

stub cable—A short branch from a principal cable. The end is often sealed until used. Pairs in the stub are referred to as stubbed-out pairs.

stub matching—Using a stub to match a transmission line to an antenna or load.

stub-supported coaxial—A coaxial cable whose inner conductor is supported by short-circuited coaxial stubs.

stub tuner—A stub terminated by movable short-circuiting means and used for matching impedance in the line to which it is joined as a branch.

stuck-at-1, stuck-at-0—A particular fault model in which a faulty node remains at a logical 1 or 0 state regardless of the inputs applied.

stud—Threaded or serrated insert or post used for connecting wires or terminals.

stud welding—A process in which the heat of an electric arc drawn between the fastener and the work melts a quantity of metal, after which the two heated parts are brought together under pressure.

stunt box—1. A device for controlling the nonprinting functions of a Teletype terminal. 2. A mechanical unit that allows a teletype operator to add control features to the teleprinter; for example, an automatic nonoverline control that prevents printing over a message already typed. Controlling a remote device is another use for the stunt box.

stutter—In facsimile, a series of undesired black and white lines sometimes produced when the signal amplitude changes sharply.

STV—See subscription TV.

stylus—Also called a needle. 1. The needlelike object used in a sound recorder to cut or emboss the record grooves. Generally it is made of sapphire, stellite, or steel. The plural is styli. 2. The pointed element that contacts the record sheet in a facsimile recorder. 3. A small piece of industrial-grade diamond or artificial sapphire, conically shaped, that tracks the groove in a phonograph record. Stylus motion is transmitted through the supporting cantilever to the generating elements in the cartridge. Styli come in several shapes, such as elliptical or spherical. 4. A hand-held object that provides coordinate input to the display device.

stylus alignment—The position of the stylus with respect to the record. The correct position is perpendicular.

stylus drag—Also called needle drag. The friction between the reproducing stylus and the surface of the recording medium.

stylus force—Also called vertical stylus force or tracking force, and formerly called needle pressure or stylus pressure. The downward force, in grams or ounces, exerted on the disc by the reproducing stylus.

stylus oscillograph—An instrument in which a pen or stylus records, on paper or another suitable medium, the value of an electrical quantity as a function of time.

stylus pressure—See stylus force.

stylus radius—The radius in mils of the spherical tip that contacts the groove wall of a phonograph record. In an elliptical stylus there are two radii. The smaller radius applies to the sides of the stylus looking down on it, and the larger radius applies to the curvature that contacts the V groove, looking along the groove.

subassembly—1. Parts and components combined into a unit for convenience in assembling or servicing. A subassembly is only part of an operating unit; it is not complete in itself. 2. A portion of a complete equipment that has one particular function in a single unit for ease of replacement. 3. A part of a complete assembly. Several subassemblies are usually required to complete an assembly. A subassembly is not normally capable of delivering an output by itself.

subatomic—Smaller than atoms—i.e., electrons or protons.

subatomic particles—The particles that make up the atom—i.e., protons, electrons, and neutrons.

subcarrier—1. A carrier used to generate a modulated wave that is applied, in turn, as a modulating wave to modulate another carrier. 2. The carrier used in stereo broadcasting to accommodate the subchannel stereo components. Frequency is 38 kHz and is suppressed at the transmitter, leaving only the sidebands, but is reformed at the receiver for detection of the stereo components by doubling the synchronized 19-kHz pilot tone. 3. A second signal “piggybacked” onto a main signal to carry additional information. In satellite television transmission, the video picture is transmitted over the main carrier. The corresponding audio is sent via an FM subcarrier. Some satellite transponders carry as many as four special audio or data subcarriers whose signals may or may not be related to the main programming. 4. A carrier wave that

modulates another higher-frequency carrier. In satellite transmissions, a 6.8 MHz audio subcarrier is often used to modulate the C-band carrier. In television, a 3.58 MHz subcarrier modulates the video carrier on each channel.

subcarrier band—A band associated with a given subcarrier and specified in terms of maximum subcarrier deviation.

subcarrier channel—The channel required to convey the telemetric information of a subcarrier band.

subcarrier discriminator tuning unit—A device that tunes the discriminator to a particular subcarrier.

subcarrier frequency shift—The use of an audio-frequency shift signal to modulate a radio transmitter.

subcarrier oscillator—1. In a telemetry system, the oscillator that is directly modulated by the measurand or its equivalent in terms of changes in the transfer elements of a transducer. 2. In a color television receiver, the crystal oscillator operating at the chrominance subcarrier frequency of 3.579545 MHz.

subcarrier substrate—A small substrate of a film circuit that is mounted in turn onto a larger substrate.

subcarrier transmission—A subdivision of carrier transmission designed to increase the capacity of the telephone system. The term is used in other circumstances in a similar fashion to indicate a transmission modulated upon a carrier or subcarrier of a communication channel.

subchannel—In a telemetry system, the route for conveying the magnitude of one subcommutated measurand.

subchassis—The chassis on which closely associated components, such as those of an amplifier or power supply, are mounted. A subchassis is a building block, easily changed and usable in a variety of systems.

subcircuit—A group of physically realizable components that performs a specific function, typically treated as a black box.

subclutter visibility—The characteristic that relates to how well a radar equipped with a moving-target indicator can see through clutter.

subcommutation—In a computer, the act of connecting one data source to a sampled data system less frequently than other data sources.

subcommutation frame—In PCM systems, a recurring integral number of subcommutator words that include the single subcommutation frame synchronization word. The number of subcommutator words is equal to an integral number of primary commutator frames. The length of a subcommutation frame is equal to the total number of words or bits generated as a direct output of the subcommutator.

subcycle generator—A frequency-reducing device used in telephone equipment to furnish ringing power at a submultiple of the power-supply frequency.

subdivided capacitor—A capacitor in which several capacitors, known as sections, are mounted so that they may be used individually or in combination.

subelement—A distinguishable portion of a circuit element (e.g., the emitter, collector, and base are subelements of an integrated bipolar transistor).

subfigure—User-defined symbols that are used repetitively in a drawing.

subframe—A complete sequence of frames during which all subchannels of a specific channel are sampled once.

subharmonic—1. A sinusoidal quantity whose frequency is an integral submultiple of the fundamental frequency of its related periodic quantity. A wave with half the frequency of the fundamental of another wave is called the second subharmonic of that wave; one with a third of the fundamental frequency is called a third subharmonic, etc. 2. A harmonic signal whose frequency is less than

that of the fundamental, being the fundamental frequency divided by an integral number. 3. A fractional multiple of the fundamental frequency.

subjamming visibility—The characteristic that relates to the ability of a particular radar antijam technique to see through jamming signals.

subject copy—Also called copy. In facsimile, the material in graphic form to be transmitted for reproduction by the recorder.

submarine cable—A cable designed for service under water; usually a lead-covered cable with a steel armor applied between layers of jute.

submerged-resistor induction furnace—A furnace for melting a metal. It comprises a melting hearth, a descending melting channel closed through the hearth, a primary induction winding, and a magnetic core that links the melting channel and primary winding.

submersible transformer—A transformer so constructed that it will operate when submerged in water under predetermined conditions of pressure and time—e.g., a subway transformer.

subminiature tube—A small electron tube used generally in miniaturized equipment.

subminiaturization—The technique of packaging discrete miniaturized parts, using assembly techniques that result in increased volumetric efficiency (e.g., a hybrid circuit).

submultiple resonance—Resonance at a frequency that is a submultiple of the frequency of the exciting impulses.

subnanosecond—Less than a nanosecond.

subpanel—An assembly of electrical devices connected together that forms a simple functional unit in itself.

subprogram—An independently compilable part of a larger computer program.

subrefraction—Atmospheric refraction that is less than standard refraction.

subroutine—1. In computer technology, the portion of a routine that causes a computer to carry out a well-defined mathematical or logical operation. 2. Usually called a closed subroutine. One to which control may be transferred from a master routine, and returned to the master routine at the conclusion of the subroutine. 3. A set of instructions and constants necessary to direct a computer to carry out a well-defined mathematical, special, or logical operation. A subroutine usually resides in mass storage and can be called by the computer whenever that specific function must be performed. It may be used over and over in the same program and in different programs. 4. A subprogram (group of instructions) reached from more than one place in a main program. The process of passing control from the main program to a subroutine is a subroutine call, and the mechanism is a subroutine linkage. Often data or data addresses are made available by the main program to the subroutine. The process of returning control from the subroutine to the main program is subroutine return. The linkage automatically returns control to the original position in the main program or to another subroutine. *See also* nesting. 5. A short program segment that performs a specific function and is available for general use by other programs and routines. 6. Computer program segment identified by name and bracketed by a "subroutine" and a "return" statement. Execution is transferred to a subroutine when a subroutine call occurs. Subroutines save memory space at the expense of execution speed.

subroutine call—*See* subroutine, 4.

subroutine linkage—*See* subroutine, 4.

subroutine reentry—In a computer, initiation of a subroutine by a program before the subroutine has completed its response to another program that called for

it. This can occur when a control program is subjected to a priority interrupt.

subroutine return—*See* subroutine, 4.

subscriber line—1. A line that connects a central office and a telephone station, private branch exchange, or other end equipment. 2. A telephone circuit from the central office to a subscriber's telephone.

subscriber loop—*See* local loop, 1.

subscriber multiple—A bank of manual-switchboard jacks that provides outgoing access to subscriber lines and usually has more than one appearance across the switchboard.

subscriber's drop—The line from a telephone cable to a subscriber's building.

subscriber's equipment—That portion of a central station alarm system installed in the protected premises.

subscriber set—Also called a customer set. An assembly of apparatus for originating or receiving calls on the premises of a subscriber to a communication or signaling service.

subscript—A notation for use in a computer to specify one member of an array in which each member is referenced only in terms of the array name.

subscripted variable—1. A variable with one or more following subscripts enclosed in parentheses. 2. A variable that has one or more numbers attached to it, indicating its place in a series or array.

subscription television—Abbreviated STV. 1. *See* pay television. 2. An over-the-air or broadcast pay TV service in which scrambled signals are sent to decoder boxes on TV sets for which viewers pay a fee to receive movies and sports programming.

subscription television broadcast program—A television broadcast program intended to be received in intelligible form by members of the public only for a fee.

subset—1. In a telephone system, the handset or deskset at the station location. 2. Also known as a modem, data set, or subscriber set. A modulation/demodulation device designed to make business-machine signals compatible with communications facilities. 3. The subscriber's telephone instrument.

Subsidiary Communications Authorization—*See* SCA.

subsonic frequency—*See* infrasonic frequency.

subsonic speed—A speed less than the speed of sound.

substation—1. Any building or outdoor location at which electric energy in a power system is transformed, converted, or controlled. 2. A junction point where several transmission and distribution lines are tied together.

substep—A part of a computer step.

substitute—In a computer, to replace one element of information by another.

substitute character—An accuracy-control character, intended to be used in place of a character determined to be invalid, in error, or not representable on a particular device.

substitution emulation—*See* emulation.

substitution interference measurement—A measurement in which the noise level of the source being measured is compared to a known level from a calibrated source; for example, an impulse generator for broadband noise or a sine-wave generator for cw.

substitution method—A three-step method of measuring an unknown quantity in a circuit. First, some circuit effect dependent on the unknown quantity is measured or observed. Then a similar but measurable quantity is substituted in the circuit. Finally, the latter

quantity is adjusted to produce a like effect. The unknown value is then assumed to be equal to the adjusted known value.

substrate—Also called base material. 1. The supporting material on or in which the parts of an integrated circuit are attached or made. The substrate may be passive (thin film, hybrid) or active (monolithic compatible). 2. A material on the surface of which an adhesive substance is spread for bonding or coating; any material that provides a supporting surface for other materials, especially materials used to support printed-circuit patterns. 3. The physical material upon which an electronic circuit is fabricated. Used primarily for mechanical support but may serve a useful thermal or electrical function. Also, a material on whose surface an adhesive substance is spread for bonding or coating, or any material that provides a supporting surface for other materials. 4. The base or support layer of a transistor or monolithic chip, which usually constitutes a major proportion of the total volume. When composed of ceramic, glass, or sapphire, the substrate functions mainly as a support during the operations of fabrication and encapsulation. However, when composed of heavily doped semiconductor material it normally performs the additional function of a distributed low-resistance connection to the physically lowest region of the device. 5. That part of an integrated circuit that acts as a support. 6. A slab of insulating material used for structural support of thick-film depositions and assembly components, usually high-purity (96 to 99 percent) alumina. *See* alumina. 7. The material on which the chips and other components are mounted, comparable to a printed circuit board. Substrate materials in common use include glass, sapphire, silicon, alumina, beryllia, and porcelainized steel. 8. The underlying material on which a microelectronic device is built.

substrate base material—The supporting material on which the elements of a thick-film circuit are deposited or attached.

subsurface wave—An electromagnetic wave propagated through water or land. Operating frequencies for communications may be limited to approximately 35 kHz due to attenuation of high frequencies.

subsynchronous—Having a frequency that is a submultiple of the driving frequency.

subsynchronous reluctance motor—A form of reluctance motor with more salient poles in the primary winding. As a result, the motor operates at a constant average speed that is a submultiple of its apparent synchronous speed.

subsystem—1. A major, essential, functional part of a system. The subsystem usually consists of several components. 2. A part or division of a system that in itself has the properties of a system. 3. An organization of computer components (e.g., a tape drive and controller) that comprises a functional unit that is part of a larger system.

subtractive filter—An optical filter that is of a certain color and eliminates that color when placed in the path of white light.

subtractive process—A printed circuit manufacturing process in which a conductive pattern is formed by the removal of portions of the surface of a metal-clad insulator by chemical means (etching).

subtractor—An operational amplifier circuit in which the output is proportional to the difference between its two input voltages or between the net sums of its positive and negative inputs.

subvoice-grade channel—A channel whose bandwidth is less than that of a voice-grade channel. Such a channel usually is a subchannel of a voice-grade line.

(According to common usage, a telegraph channel is excluded from this definition.)

subwoofer—A speaker that is specifically made to reproduce the lowest of audio frequencies, between approximately 20 Hz and 100 Hz.

success ratio—The ratio of the number of successful attempts to the total number of trials. It is frequently used as a reliability index.

suckout—A hole in the response pattern of a tuned circuit due to the self-resonance of components at certain frequencies.

sudden commencement—Magnetic storms that start suddenly (within a few seconds) and simultaneously all over the earth.

sudden ionospheric disturbances—The sudden increase in ionization density in lower parts of the ionosphere, caused by a bright solar chromospheric eruption. It gives rise to a sudden increase of absorption in radio waves propagated through the low parts of the ionosphere, and sometimes to simultaneous disturbances of terrestrial magnetism and earth current. The change takes place within one or a few minutes, and conditions usually return to normal within one or a few hours.

Suhl effect—When a strong transverse magnetic field is applied to an n-type semiconducting filament, the holes injected into the filament are deflected to the surface. Here they may recombine rapidly with electrons and, thus, have a much shorter life, or they may be withdrawn by a probe as though the conductance had increased.

suicide control—A control function that uses negative feedback to reduce and automatically maintain the generator voltage at approximately zero.

sulfating—The accumulation of lead sulfate on the plates of a lead-acid storage battery. This reduces the energy-storing ability of the battery and causes it to fail prematurely.

sulfation—The lead sulfate that forms on battery plates as a result of the battery action that produces electric current.

sulfonated polystyrene sensor—Also called Pope cell. An ion-exchange device with good response, accuracy, and long-term stability whose resistance changes exponentially with humidity and temperature.

sum—The combination of two electrical signals of the same electrical polarity. The total electrical energy produced by combining the two different signals of a stereo program.

sum channel—A combination of left and right stereo channels identical to the program, which may be recorded or transmitted monophonically.

summary punch—A punch-card machine that may be attached to another machine in such a way that it will punch information produced, calculated, or summarized by the other machine.

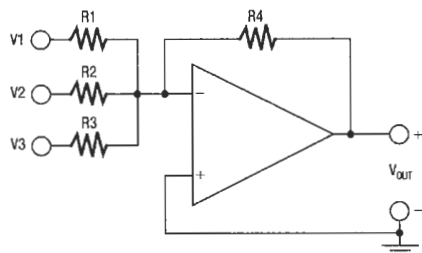
summary recorder—In computers, output equipment that records a summary of the information handled.

summation check—A redundant computer check in which groups of digits are summed, usually without regard to overflow. The sum is then checked against a previously computed sum to verify the accuracy of the computation.

summation frequency—A frequency that is the sum of two other frequencies that are produced simultaneously.

summation tone—A combination tone, heard under certain circumstances, whose pitch corresponds to a frequency equal to the sum of the frequencies of the two components.

summing junction—The input terminal of an operational amplifier that is inverted and has both input and feedback connected to it.



Summing amplifier.

summing point — 1. A mixing point whose output is obtained by adding its inputs (with the prescribed signs). 2. The input terminal to which the feedback loop from the output of an amplifier is returned.

sum of products — A general form of Boolean-algebraic expression that can be implemented readily through the use of electronic gate circuits.

sum operand — In a calculator, automatically adds first factors of any sequence of multiplication or division problems. Used when obtaining average unit price and standard deviation.

superband — The frequency band from 216 to 300 MHz, used for fixed and mobile radios and additional television channels on a cable system.

supercardioid — Similar to cardioid but with a narrower response lobe.

supercardioid microphone — A microphone having a cardioid "polar pattern" with an unusually high discrimination between sounds from the front and rear.

supercommutation — 1. Commutation at a higher rate by connection of a single data input source to equally spaced contacts of the commutator (cross patching). Corresponding cross patching is required at the decommutator. 2. The connection of one data source of a computer to a sampled-data system more frequently than other data sources are connected.

superconducting — Exhibiting superconductivity.

superconductivity — 1. The ability of certain alloys and metals, such as lead, tin, and vanadium, to conduct electricity with zero resistance. In general, electrical resistance falls as the temperature of a conductor decreases. For certain metals and alloys, resistance abruptly drops to nil when the temperature reaches a specific point near absolute zero. In recent years, superconductivity has been achieved at temperatures as high as -140°C . 2. The decrease in resistance of certain materials (lead, tin, thallium, etc.) as their temperature is reduced to nearly absolute zero. When the critical (transition) temperature is reached, the resistance will be almost zero.

superconductors — Materials that exhibit superconductivity. These are materials in which the resistance drops to almost zero at a temperature near absolute zero.

Superconductivity is exhibited by many of the metallic elements, their alloys, and intermetallic compounds.

super-emitron — See image iconoscope.

supergroup — In carrier telephony, five groups (60 voice channels) multiplexed together and handled as a single unit. A basic supergroup occupies the 312 to 552 kHz band.

superhet — Slang for a superheterodyne receiver.

superheterodyne receiver — 1. A receiver in which the incoming modulated rf signals are usually amplified in a preamplifier and then fed into the mixer for conversion into a fixed, lower carrier frequency (called the intermediate frequency). The modulated IF signals undergo very high amplification in the IF-amplifier stages and are then fed into the detector for demodulation. The resultant audio or video signals are usually further amplified before being sent to the output. 2. A receiver that converts the incoming signal to an intermediate frequency and amplifies the signal at an intermediate frequency before detection.

superheterodyne reception — A method of receiving radio waves in which heterodyne reception converts the voltage of the intermediate, but usually superaudible, frequency, which is then detected.

superhigh frequency — Abbreviated SHF. The frequency band extending from 3 to 30 GHz (100 to 10 mm).

superimpose — In a tape recorder, to record one or more signals over another without erasure, so that when a tape is played back, all recordings can be heard simultaneously. (Particularly useful if one wishes to have a spoken commentary with a musical background.)

Supermalloy — Trade name of Arnold Engineering Company for a magnetic alloy with a maximum permeability greater than 1,000,000.

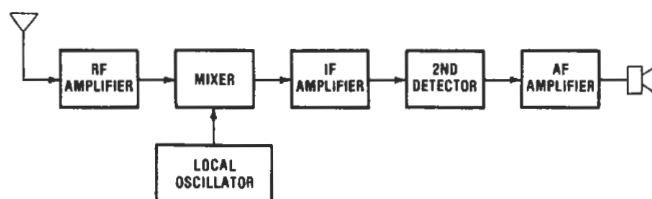
supermode laser — A frequency-modulated laser whose output is passed through a second phase modulator driven 180° out of phase and with the same modulation index as the first modulator. All of the energy of the previously existing laser modes is compressed into a single frequency, with nearly the full power of the laser concentrated in that signal.

superposed circuit — An additional channel obtained in such a manner from one or more circuits normally provided for other channels that all channels can be used simultaneously, without mutual interference.

superposed ringing — Also called superimposed ringing. Party-line telephone ringing accomplished by using a combination of alternating and direct currents; direct current of both polarities is used to provide selective ringing.

superposition — The process of adding two or more signals together and having each signal retain its unique identity.

superposition theorem — When a number of voltages (distributed in any manner throughout a linear network) are applied to the network simultaneously, the current that flows is the sum of the component currents



Superheterodyne receiver.

that would flow if the same voltages had acted individually. Likewise, the potential difference that exists between any two points is the component potential difference that would exist there under the same conditions.

superpower — A comparatively large power (sometimes over 1,000,000 watts) used by a broadcasting station in its antenna.

superradiance — In lasers, a rapid increase in intensity of fluorescent line emission with increasing excitation (pump) power. This intensity increase and associated line narrowing are attributed to coherent reinforcement of spontaneously emitted photons during a single pass through the active region.

superrefraction — Abnormally large refraction of radio waves in the lower layers of the atmosphere, leading to abnormal ranges of operation.

superregeneration — 1. A form of regenerative amplification frequency used in radio-receiver detecting circuits. Oscillations are alternately allowed to build up and are quenched at a superaudible rate. 2. Method used to produce greater regeneration than otherwise possible without the harmful effects of oscillation. *See also* quench frequency.

superregenerative detector — A detector that functions on superregeneration to achieve extremely high sensitivity with a minimum of amplifier stages.

superregenerative receiver — A receiver in which the regeneration is varied in such a manner that the circuit is periodically rendered oscillatory and nonoscillatory.

supersensitive relay — A relay that operates on extremely small currents (usually less than 250 microamperes).

supersonic — Faster than the speed of sound (approximately 750 mph or 1200 km/h). These speeds are usually referred to by the term *mach* or *mach number*. Mach 1 equals the speed of sound; mach 2, twice the speed of sound, etc.

supersonic communication — Communication through water by manually keying the sound output of echo-ranging equipment used on ships.

supersonic frequency — *See* ultrasonic frequency.

supersonics — 1. The general term covering phenomena associated with speeds higher than that of sound (e.g., aircraft and projectiles that travel faster than sound). 2. The general term covering the use of frequencies above the range of normal hearing.

supersonic sounding — A system of determining ocean depths by measuring the time interval between the production of a supersonic wave just below the surface of the water and the arrival of the echo reflected from the bottom. The sounds are transmitted and received by either magnetostriction or piezoelectric units, and electronic equipment is employed to provide a continuous indication of depth (sometimes with a permanent recording).

supersync signal — A combination horizontal- and vertical-sync signal transmitted at the end of each scanning line in commercial television.

superturnstile antenna — A stacked antenna array in which each element is a batwing antenna.

supertweeter — A tweeter used usually in four-way or five-way systems only for extremely high frequencies.

Super Video Graphics Array — *See* SVGA.

supervised lines — Interconnecting lines in an alarm system that are electrically supervised against tampering. *See also* line supervision.

supervisor — 1. A routine or routines carried out in response to a requirement for changing or interrupting the flow of operation through a central processing unit, or for performance of input-output operations; therefore, the medium for coordinating the use of resources and maintaining the flow of operations through the central

processing unit. Hence, a control routine executed in supervisor state. 2. A program that helps manage the operation of a computer system.

supervisory alarm system — An alarm system that monitors conditions or persons or both and signals any deviation from an established norm or schedule. Examples are the monitoring of signals from guard patrol stations for irregularities in the progression along a prescribed patrol route, and the monitoring of production or safety conditions such as sprinkler water pressure, temperature, or liquid level.

supervisory circuit — An electrical circuit or radio path that sends information on the status of a sensor or guard patrol to an annunciator. For intrusion alarm systems, this circuit provides line supervision and monitors devices. *See also* supervisory alarm system.

supervisory control — 1. A system by which selective control and automatic indication of remote units is provided by electrical means over a relatively small number of common transmission lines. (Carrier-current channels on power lines can be used for this purpose.) 2. An arrangement for selectively controlling remotely located equipment by electrical means.

supervisory control signaling — Characters or signals that actuate equipment or indicators at a remote terminal automatically.

supervisory signal — A signal for attracting the attention of an attendant in connection with switching apparatus, etc.

supervoltage — A voltage applied to X-ray tubes operating between 500 and 2000 kilovolts.

supplementary group — In wire communications, a group of trunks that provides direct connection of local or trunk switching centers by way of other than a fundamental route.

supplementary insulation — An independent insulation provided in addition to the functional insulation to ensure protection against electrical shock hazard in the event that functional insulation should fail.

supply port — In a fluidic device, the port at which power is provided to an active device.

supply reel — 1. In a tape recorder, the feed reel from which the tape unwinds while playing or recording. 2. On a tape recorder, the reel generally on the left side of the recording head stack. It has a full reel of tape prior to beginning of the recording.

supply voltage — The voltage obtained from a power supply to operate a circuit.

support chips — 1. Integrated circuits, exclusive of the microprocessor unit (the central processing unit of the microcomputer), that are required to complete a system. These chips must be compatible with the selected microprocessor and are generally part of the same family as the microprocessor unit. The degree of the support chip's flexibility and availability is what will determine the total capability of a microcomputer system and, thus, becomes a significant factor in the selection of one system over another. 2. Semiconductor chips required to make the MPU functional, such as a clock generator. Includes chips that directly interface with the MPU to enhance its function, such as a DMA or a dedicated MCU supplied by a manufacturer as a standard part. Also includes chips that are not connected directly to the MPU but which enhance its function, such as a modem. A support chip may or may not contain memory. A memory with I/O ports would be considered a support chip, whereas a chip containing only memory would be classified as a memory device.

support software — A library of software tools used selectively or in total to produce software. This library

may consist of compiler, link, editors, source update programs, etc.

suppressed carrier — 1. That type of system which results in the suppression of the carrier frequency from the transmission medium. The intelligence of a carrier wave after modulation is contained in either sideband, and normally only one sideband is transmitted; the other sideband and carrier frequency are suppressed. The intelligence is recovered at the receiving end by inserting a carrier frequency from a local source that, when combined with the incoming signal, produces the original frequencies with which the transmitting carrier was modulated. 2. A method of transmission in which one or more sidebands are transmitted but the carrier is not transmitted.

suppressed-carrier operation — See suppressed-carrier transmission.

suppressed-carrier transmission — Transmission in which the carrier frequency is either partially or totally suppressed. One or both sidebands may be transmitted.

suppressed time delay — Deliberate displacement of the zero of the time scale with respect to the time of emission of a pulse, in order to simulate electrically a geographical displacement of the true position of a transponder.

suppressed-zero instrument — An indicating or recording instrument in which the zero position is below the end of the scale markings.

suppression — 1. Elimination of any component of an emission—e.g., a particular frequency or group of frequencies in an audio- or radio-frequency signal. 2. Reduction or elimination of noise pulses generated by a motor or motor generator. 3. Elimination of unwanted signals or interference by means of shielding, filtering, grounding, component relocation, or sometimes redesign. 4. An optical function in online or offline printing devices by which they can ignore certain characters or character groups transmitted through them. 5. The reduction to an acceptable level of a certain frequency or frequencies.

suppression pulse — The pulse generated in an airborne transponder by coincidence of the first interrogation pulse and the control pulse. This pulse, also known as a killer pulse, is used to suppress unwanted interrogations from the side lobes.

suppressor — 1. A resistor used in an electron-tube circuit to reduce or prevent oscillation or the generation of unwanted rf signals. 2. A resistor in the high-tension lead of the ignition system in a gasoline engine.

suppressor grid — A grid interposed between two positive electrodes (usually the screen grid and the plate) primarily to reduce the flow of secondary electrons from one to the other.

suppressor pulse — The pulse used to disable an ionized flow field or beacon transponder during intervals when interference would be encountered.

surface acoustic wave — A sound or acoustic wave that travels on the surface of the optically polished surface of a piezoelectric material. This wave travels at the speed of sound but can pass frequencies as high as several gigahertz. Its amplitude decays exponentially with substrate depth.

surface analyzer — An instrument that measures or records irregularities in a surface. As a crystal-pickup stylus or similar device moves over the surface, the resulting voltage is amplified and fed to an indicator or recorder that magnifies the surface irregularities as high as 50,000 times.

surface asperities — Small projecting imperfections on the surface coating of a tape that limit and cause

variations in head-to-tape contact. A term useful in discussions of friction and modulation noise.

surface barrier — A barrier formed automatically at a surface by the electrons trapped there.

surface-barrier transistor — Abbreviated SBT. A wafer of semiconductor material into which depressions have been etched electrochemically on opposite sides. The emitter- and collector-base junctions or metal-to-semiconductor contacts are then formed by electroplating a suitable metal onto the semiconductor in the etched depressions. The original wafer constitutes the base region. No longer manufactured.

surface conductance — Conductance of electrons along the outer surface of a conductor.

surface-controlled avalanche transistor — A transistor in which the avalanche breakdown voltage is controlled by an external field applied through surface insulating layers, and which permits operation at frequencies up to the 10-GHz range.

surface diffusion — The high-temperature injection of atoms into the surface layer of a semiconductor material to form the junctions. Usually a gaseous diffusion process.

surface duct — An atmospheric duct for which the lower boundary is the surface of the earth.

surface electromagnetic waves — Waves that propagate along the interface between two different media without radiation, with exponentially decaying evanescent fields on both sides of the interface.

surface insulation — Also called oxalizing or insulating. A coating applied to magnetic-core laminations to retard the passage of current from one lamination to another.

surface leakage — The passage of current over the surface of an insulator rather than through it. Surface leakage in new components is very low, but when a component is installed in equipment and exposed to dust, dirt, moisture, and other degrading environments, leakage current can increase and cause problems.

surface mounting — 1. Connecting discrete components directly to foil patterns without using holes. 2. A packaging technique that attaches components directly to a circuit board rather than using leads, thus saving space.

surface noise — Also called needle scratch. 1. In mechanical recording, the noise caused in the electrical output of a pickup by irregular contact surfaces in the groove. 2. Noise generated by contact of a phonograph stylus with minute particles of dust or other irregularities in a record groove. Can also be caused by excessive wear of a disc or by poor-quality coating on recording tape.

surface of position — Any surface defined by a constant value of some navigational coordinate.

surface recombination rate — The rate at which free electrons and holes recombine at the surface of a semiconductor.

surface recording — Storage of information on a coating of magnetic material such as that which is used on magnetic tape, magnetic drums, etc.

surface reflection — Also called Fresnel loss. The part of the incident radiation that is reflected from the surface of a refractive material. It is directly proportional to the refractive index of the material and is reduced for a given wavelength by application of an appropriate surface coating.

surface resistance — The ratio of the direct voltage applied to an insulation system to the current that passes across the surface of the system. In this case, the surface consists of the geometric surface and the material immediately in contact with it. The thin layer of moisture at the interface between a gas and a solid usually has the greatest effect on surface resistance.

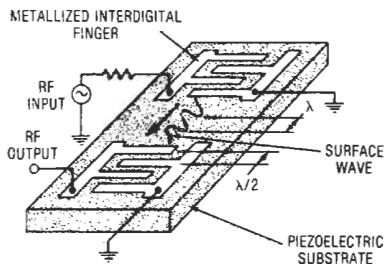
surface resistivity—1. The resistance between opposite edges of a surface film 1 cm square. Since the length and width of the path are the same, the centimeter terms cancel. Thus, units of surface resistivity are actually ohms. To avoid confusion with usual resistance values, surface resistivity is normally given in ohms per square. It is measured by determining the resistance between two straight conductors 1 cm apart, pressed upon the surface of a slab of the material. Water-absorbent materials usually show a lower resistivity than nonabsorbent ones. 2. The resistance of the surface of an insulating material to the dc current.

surface states—Discontinuities and contaminants at the surface of a semiconductor device, which tend to change the surface characteristics and promote device parameter instability.

surface-temperature resistor—A platinum resistance thermometer designed for installation directly on the surface whose temperature is being measured.

surface wave—1. A subclassification of the ground wave. So called because it travels along the surface of the earth. 2. A wave that travels along the interface between two media without radiation, such as an electric wave on the surface of a wire surrounded by air. 3. A radio wave that reaches the reception point from the transmitter by traveling along the surface of the earth rather than by reflection from the ionosphere.

surface-wave filter—A filter whose operation is based on the use of the interlaced, deposited electrode pairs and acoustic surface waves on a single crystal substrate. The device operates on traveling-wave principles, not a lumped-element concept.



Surface-wave device.

surface-wave transmission line—Abbreviated SWTL. Ideally, a nonradiating broadband transmission line that functions by guiding electromagnetic energy in the surrounding air. A surface line allows coupling to the field anywhere along the guide (in contrast to an ordinary waveguide, in which the internal fields are completely screened from external space by metal walls). A noncontacting device can be used to couple some or all of the energy to or from the line.

surfing—1. Casually roaming around the Internet. 2. Exploring the World Wide Web. Commonly called surfing the Net.

surfing the Net—Navigating the Internet; usually, random Web browsing.

surge—1. Sudden current or voltage changes in a circuit. 2. A transient variation in the current and/or potential at a point in the circuit. 3. An oversupply of voltage from the power company, lasting as long as several seconds. A strong surge can damage electronic equipment.

surge admittance—Reciprocal of surge impedance.

surge-crest ammeter—A special magnetometer used with magnetizable links to measure the crest value of transient electric currents.

surge current rating—The maximum current pulse that can be carried by a semiconductor diode for the specified length of time, repetition frequency, waveform, and temperature.

surge generator—See impulse generator, 1.

surge impedance—See characteristic impedance.

surge-limiting capacitor—A capacitor intended to limit the maximum voltage across the terminations by acting as a low impedance to surges.

surge suppressor—Also called voltage clipper or thyrector. A two-terminal device (pnp) that will conduct in either direction above a specified voltage and polarity, but otherwise acts as a blocking device to current. It essentially is a back-to-back diode with avalanche characteristics for protecting circuitry from high alternating voltage peaks or transients.

surge voltage (or current)—1. A large, sudden change of voltage (or current), usually caused by the collapse of a magnetic field or by a shorted or open circuit element. 2. The maximum voltage (or current) to which the capacitor should be subjected under any conditions. This includes transients and peak ripple at the highest line voltage.

surge-voltage recorder—See Lichtenberg figure camera.

surround—The part of a speaker cone by which its outside edge is anchored, usually corrugated.

surround sound—1. A system of audio reproduction that uses four or more speakers to simulate the full three-dimensional effect of a live musical performance or cinematic environment. 2. An audio system that includes front and rear channels and sometimes a front and center channel to stimulate the full three-dimensional effect of a live performance.

surveillance—1. Systemic observation of air, surface, or subsurface areas by visual, electronic, photographic, or other means. 2. Control of premises for security purposes through alarm systems, closed-circuit television (CCTV), or other monitoring methods. 3. Supervision or inspection of industrial processes by monitoring those conditions that could cause damage if not corrected. See also supervisory alarm system.

surveillance radar—In air traffic control systems, a radar set or system used in a ground-controlled approach system to detect aircraft within a certain radius of an airport and to present continuously to the radar operator information as to the position, in distance and azimuth, of these aircraft.

surveillance radar station—In the aeronautical radionavigation service, a land station employing radar to detect the presence of aircraft.

survivability—The measure of the degree to which an item will withstand hostile human-made environments and not suffer abortive impairment of its ability to accomplish its designated mission.

SUS—See silicon unilateral switch.

susceptance—1. The reciprocal of reactance, and the imaginary part of admittance. It is measured in siemens. 2. The component of (sinusoidal) current in quadrature with the terminal voltage of a circuit, divided by that voltage.

susceptance standard—A standard with which small, calibrated values of shunt capacitance are introduced into 50-ohm coaxial transmission arrays.

susceptibility—1. Ratio of the induced magnetization to the inducing magnetic force. 2. The undesired response of an equipment to emissions, interference, or

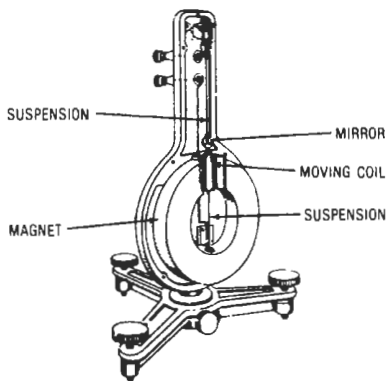
transients, or to signals other than those to which the equipment is intended to be responsive.

susceptibility meter—A device for measuring low values of magnetic susceptibility.

susceptiveness—The tendency of a telephone system to pick up noise and low-frequency induction from a power system. It is determined by telephone-circuit balance, transpositions, wire spacing, and isolation from ground.

suspension—A wire that supports the moving coil of a galvanometer or similar instrument.

suspension galvanometer—An early type of moving-coil instrument in which a coil of wire was suspended in a magnetic field and would rotate when it carried an electric current. A mirror attached to the coil deflecting a beam of light, causing a spot of light to travel on a scale some distance from the instrument. The effect was a pointer of greater length but no mass.



Suspension galvanometer.

sustain—In an organ, the effect produced by circuitry that causes a note to diminish gradually after the key controlling the note has been released.

sustained oscillation—1. Oscillation in which forces outside the system but controlled by it maintain a periodic oscillation at a period or frequency that is nearly the natural period of the system. 2. Continued oscillation due to insufficient attenuation in the feedback path.

sustained start—An electrical signal for starting a timer that is of any duration longer than the timer setting.

sustaining current—The current required to maintain ionization across a spark gap.

SVGA—Abbreviation for Super Video Graphics Array. An enhancement from VGA monitors. SVGA monitors can display a resolution up to 1028 × 768 and up to 16.7 million colors.

sw—Abbreviation for shortwave.

swamping resistor—In transistor circuits, a resistor placed in the emitter lead to mask (minimize the effects of) variations caused in the emitter-base junction resistance by temperature variations.

swamp resistance—A small amount of resistance, provided by a resistor with a negative or small positive resistance-temperature coefficient, placed in series with the coil of an electrical indicating instrument to reduce the overall temperature coefficients of the instrument. The resistor also may be used for adjustment of the terminal resistance of the meter.

swap—Refers to the process of moving part of a program from the main memory to external storage (tape

or disk) so that another piece of program can be moved from external storage to main memory. Swapping reduces computer efficiency, but it allows the system to get along with less memory.

swapping—1. A time-sharing term referring to the transfer of a currently operating program from system memory to an external storage device, the replacement of that program by a program of higher priority, and the restoration of the temporarily stored program following execution of the higher-priority program. 2. A feature of an operating system that permits suspended tasks to be moved to secondary storage in order to generate enough memory space so that the next task of the ready list can be loaded into memory (if it is not already resident) and executed. The task will be swapped back into system memory when it is scheduled to resume execution. This movement to and from secondary storage may occur many times to a given task before its executing is complete.

sweating—Soldering by assembling and heating parts previously coated with solder.

SWECS—Abbreviation for small wind energy conversion systems. A system with a generating capacity less than 100,000 kW.

sweep—The crossing of a range of values of a quantity for the purpose of delineating, sampling, or controlling another quantity. Examples of swept quantities are the displacement of a scanning spot on the screen of a cathode-ray tube, and the frequency of a wave.

sweepable equalizer—An equalizer whose center frequency is continuously variable over a given frequency range, but the Q is not variable.

sweep accuracy—The accuracy of the trace horizontal displacement in an oscilloscope compared with the reference independent variable, usually expressed in terms of average rate error as a percent of full scale.

sweep amplifier—An amplifier stage designed to increase the amplitude of the sweep voltage.

sweep circuit—A circuit that produces, at regular intervals, an approximately linear, circular, or other movement of the beam in a cathode-ray tube.

sweep delay—The time between the application of a pulse to the sweep-trigger input of an oscilloscope and the start of the sweep.

sweep-delay accuracy—The accuracy of an indicated sweep delay in an oscilloscope, usually specified in error terms.

sweep expander—See sweep magnifier.

sweep-frequency generator—1. A signal source capable of changing frequency automatically and in synchronism with a display device. The frequency sweep can be obtained by either mechanical or electronic means. 2. An oscillator that generates an audio or radio frequency that is repetitively swept, low to high or high or low, over a preset band of frequencies to provide a test signal for wideband devices.

sweep-frequency record—A test record on which a series of constant-amplitude frequencies have been recorded. Each frequency is typically repeated 20 times per second, starting at 50 Hz and continuing up to 10 kHz or higher.

sweep generator—Also called timing-axis oscillator. A circuit that applies voltages or currents to the deflection elements in a cathode-ray tube in such a way that the deflection of the electron beam is a known function of time against which other periodic electrical phenomena may be examined, compared, and measured.

sweeping receivers—Automatically and continuously tuned receivers designed to stop and lock on when a signal is found or to continually plot band occupancy.

sweep jammer—An electric jammer that sweeps a narrow band of electronic energy over a broad bandwidth.

sweep linearity—The maximum displacement error of the independent variable between specified points on the display area in an oscilloscope.

sweep lockout—A means for preventing multiple sweeps when operating an oscilloscope in a single-sweep mode.

sweep magnifier—Also called sweep expander. A circuit or control for expanding part of the sweep display of an oscilloscope.

sweep oscillator—An oscillator used to develop a sawtooth voltage that can be amplified to deflect the electron beam of a cathode-ray tube. *See also* sweep generator.

sweep switching—The alternate display of two or more time bases or other sweeps using a single-beam CRT. Comparable to dual- or multiple-trace operation of a deflection amplifier.

sweep test—Pertaining to cable, checking the frequency response by generating an rf voltage whose frequency is varied back and forth through a given frequency range at a rapid constant rate while observing the results on an oscilloscope.

sweep-through—A jamming transmitter that sweeps through a radio-frequency band and jams each frequency briefly, producing a sound like that of an aircraft engine.

sweep voltage—The voltage used for deflecting an electron beam. It may be applied to either the magnetic deflecting coils or the electrostatic plates.

swell manual—Also called solo manual. In an organ, the upper manual normally used to play the melody. *See also* manual, 2.

swept resistance—The portion of the total resistance of a potentiometric transducer over which the slider travels when the device is operated through its total range.

swim—The phenomenon in which the constructs on a CRT screen appear to move about their normal position. It can be observed when the refresh rate is slow and is not some multiple or submultiple of line frequency. In some cases, swim is a result of instability in the digital-to-analog converters in the display controller.

swimming—Lateral shifting of a thick-film conductor pattern on molten glass crossover patterns.

swing—1. The variation in frequency or amplitude of an electrical quantity. 2. The total variation of voltage, current, or frequency. 3. The arc traversed by the needle of a meter.

swingback permeability—*See* reversible permeability.

swinger—1. A swinging short. 2. *See* swing short.

swinging—1. Momentary variations in frequency of a received wave. 2. Existing only for short periods.

swinging arm—A type of mounting and feed used to move the cutting head at a uniform rate across the recording disc in some recorders. All phonograph pickups are of the swinging-arm type.

swinging choke—1. A filter inductor designed with an air gap in its magnetic circuit so its inductance decreases as the current through it increases. When used in a power-supply filter, a swinging choke can maintain approximately critical inductance over wide variation in load current. 2. An audio-frequency choke whose core is operated saturated with flux. It is used at the input of a power-supply filter for improved voltage regulation. Its inductance is at a maximum for small currents, and charges (swings) to a minimum for large currents.

swing short—Also called swinger. A come-and-go (intermittent) short produced by a pair of wires swinging together in the wind.

swiss-cheese packaging—Also called imitation 2D. A high-density packaging technique in which passive and active components are inserted into holes punched in printed circuit board substrates and attached by soldering or thermocompression bonding or by means of conductive epoxy adhesive.

switch—1. A mechanical or electrical device that completes or breaks the path of the current or sends it over a different path. 2. In a computer, a device or programming technique by means of which selections are made. 3. A device that connects, disconnects, or transfers one or more circuits and is not designated as a controller, relay, or control valve. The term is also applied to the functions performed by switches. 4. A mechanical component for opening or closing (interrupting or completing) one or more electrical circuits. In electronics, as opposed to the electrical industry, switches tend to be low-voltage, low-current units scaled to the size of the equipment in which they function. Switches suitable for opening and closing 120- and 240-volt ac line current and various dc and signal-level voltages under 100 volts dc predominate. 5. A mechanical or electronic device designed for conveniently interrupting, completing, or changing connections in electrical circuits whenever desired or necessary. Mechanical types may control more than one circuit by incorporating multiple-contact elements that are controlled by the same actuator. Electronic switches ordinarily control only a single electrical circuit.

switchboard—1. A manually operated apparatus at a telephone exchange. The various circuits from subscribers and other exchanges terminate here, so that operators can establish communications between two subscribers on the same exchange or on different exchanges. 2. A single large panel or an assembly of panels on which are mounted the switches, circuit breakers, meters, fuses, and terminals essential to the operation of electrical equipment. 3. An attended console where telephone subscribers' lines appear for answering and calling. An operator interconnects lines and trunks and supervises the connections.

switch detector—A detector that extracts information from the input waveform only at instants determined by a selector pulse.

switched capacitor—A technique commonly used in analog signal processing to create filtering and signal conditioning circuits.

switched line—Also called dial-up line. A communications link for which the physical path may vary with each usage, such as the public telephone network.

switched network—Also called public switched network and switched message network. 1. The network by which switched telephone service is provided to the public. 2. A multipoint network with circuit switching capabilities. The telephone network is a switched network, as are Telex and TWX.

switcher—1. A catchall term for a power source that employs switching techniques to achieve higher-efficiency regulation. Can include line switchers and conventional transformer/rectifier ac-operated power sources employing switching regulator techniques. 2. A device that allows the pictures from a number of cameras to be viewed on one monitor. 3. *See* switching power supply.

switch-fader—A control that permits each of two or more cameras to be selectively fed into the distribution system. The fader permits gradual transition from one camera to another.

switch gear—A general term covering switching, interrupting, control, metering, protective, and regulating devices; also assemblies of these devices and associated interconnections, accessories, and supporting structures,

used primarily in connection with the generation, transmission, and distribution of electric power.

switch hook—A switch associated with the structure on a telephone set that supports the receiver or handset. The switch is operated when the receiver or handset is removed from or replaced on the support.

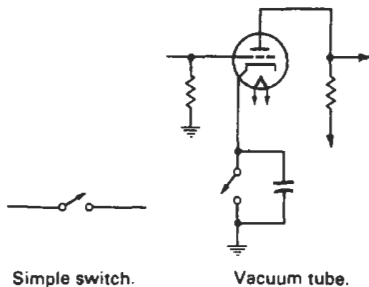
switching—1. Making, breaking, or changing the connections in an electrical circuit. 2. The action of turning a device on and off.

switching amplifier—1. One whose output stage rapidly switches output power between transistor saturation and cutoff. Average output current is varied by controlling switching frequency, pulse amplitude, duty cycle, or any combination of these factors. Usually, however, switching amplifiers control power by modulating either pulse width or pulse frequency. Switching rates can be varied up to about 100 kHz. Since a switching amplifier controls output power by varying on-off time ratio of the output pulses, amplifier heat dissipation varies little from a nominal rating and is much less than that of amplifiers that consume unused power. However, switching amplifiers generate transients that can upset the operation of nearby electronic circuits. 2. *See* class D amplifier.

switching center—1. A location at which data from an incoming circuit is routed to the proper outgoing circuit. 2. A group of equipment within a relay station for automatically or semiautomatically relaying communications traffic. 3. A location where an incoming call/message is automatically or manually directed to one or more outgoing circuits. 4. *See* switching office.

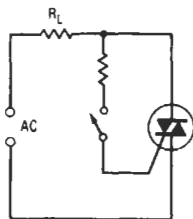
switching characteristics—An indication of how a device responds to an input pulse under specified driving conditions.

switching circuit—A circuit that performs a switching function. In computers, this is performed automatically by the presence of a certain signal (usually a pulse signal). When combined, switching circuits can perform a logical operation.



Simple switch.

Vacuum tube.



Triac.

Switching circuits.

switching coefficient—The derivative of applied magnetizing force with respect to the reciprocal of the

resultant switching time. It is usually determined as the reciprocal of the slope of a curve of reciprocals of switching times versus the values of applied magnetizing forces, which are applied as step functions.

switching control—An installation in a wire system where telephone or teletypewriter switchboards are installed to interconnect circuits.

switching current—The current through a device at the switching voltage point.

switching device—Any device or mechanism, either electrical or mechanical, that can place another device or circuit in an operating or nonoperating state.

switching differential—The difference between the operate and release points of a switch, caused by hysteresis. It can be in units of amperes, volts, inches, gauss, etc. *See* hysteresis.

switching diode—A diode that has a high resistance (corresponding to an open switch) below a specified applied voltage but changes suddenly to a low resistance (closed switch) above that voltage.

switching equipment—Equipment located in the telephone company offices that makes the interconnection between the station equipment of two or more subscribers.

switching hysteresis—The principle associated with sensors, such that the operate point is not at the same level as the release point. In solid-state sensors it is accomplished with negative-resistance devices, and in mechanical switches it results from the storing of potential energy before the transition occurs.

switching mode—A way of utilizing a vacuum tube or transistor so that (except for negligibly small transition times) it is either in cutoff or saturation. A transistor operated in this mode can switch large currents with little power dissipation.

switching office—Also called switching center. A location where either toll or local telephone traffic is switched or connected from one line or circuit to another.

switching pad—A transmission-loss pad automatically inserted into or removed from a toll circuit for different desired operating conditions.

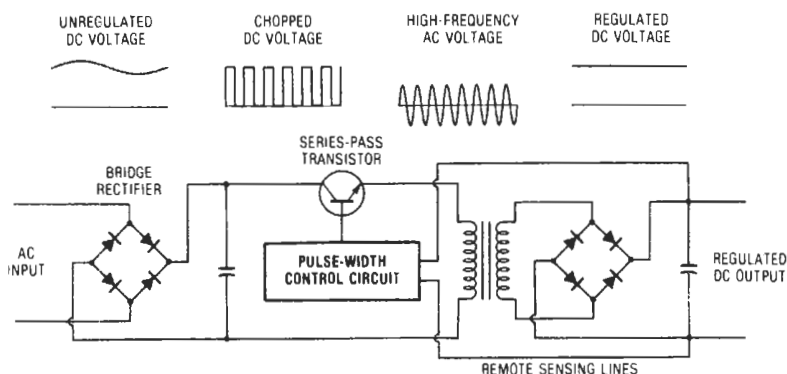
switching power supply—Also called switcher. A power supply (usually dc output) that achieves its output regulation by means of one or more active power-handling devices that are alternately placed in the off and on states. Distinguished from linear or dissipative power supplies, in which regulation is achieved by power-handling devices whose conduction is varied continuously over a wide range that seldom (if ever) includes the full off or full on condition. *See* figure on page 753.

switching regulator—A power supply design that achieves efficient regulation by commuting the input voltage into a filter circuit.

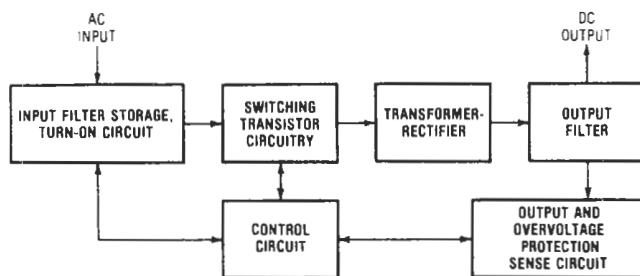
switching time—1. The interval between the reference time and the last instant at which the instantaneous-voltage response of a magnetic cell reaches a stated fraction of its peak value. 2. The interval between the reference time and the first instant at which the instantaneous integrated-voltage response reaches a stated fraction of its peak value. 3. The time for a multiplexer to change from one channel to the next with the new output signal remaining within a specified percentage of its final value. Expressed for a maximum voltage transition.

switching transients—Transient voltage spikes that appear at a multiplexer's output when the multiplexer is switched from one channel to another and one of the switches is turned off. Such spikes may cause inaccurate measurements if output is sampled, digitized, or integrated during this time.

switching transistor—A three-terminal device with one terminal controlling the electrical impedance



Schematic.



Block diagram.

Switching power supply.

between the other two. Typical transistor switching circuits include inverters, converters, switching voltage regulators, and relay and solenoid drivers.

switching trunk—A trunk that runs between a long-distance office and a local exchange office and is used for completing a long-distance call.

switching voltage—The maximum forward voltage a device can sustain without breaking over into full conduction.

switchplate—A small plate attached to a wall to cover a push-button or other type of switch.

switch register—A physical register made up of a number of manual switches, typically equal to the number of bits in the computer, and generally located on the computer control panel. The switch register is used to manually enter addresses and data into the computer's memory and to manually intervene in program execution. The function performed by a physical switch register can also be implemented by software, with switches being set through a terminal device or a memory location.

switch room—That part of a telephone central office building that houses switching mechanism and associated apparatus.

switchtail ring counter—A type of ring counter in which the output of one stage is inverted before being applied as an input to the next stage. An even number of states equal to $2n$ (where n is the number of flip-flops) normally is produced. For example, a modulo-10 counter can be made from five flip-flops. Each flip-flop changes states on every fifth count. Decoding of all 10 states is accomplished conveniently with 10 two-input gates. A switchtail ring counter will contain the complement of the information it contained initially after n clock pulses, and will contain the initial information again after $2n$ clock pulses.

switch train—A sequence of switches through which connection must be made when a circuit between a calling telephone and a called telephone is established.

SWL—Shortwave listener; one who tunes the short-wave bands as a hobby.

SWR—Abbreviation for standing-wave ratio.

SWR bridge—See standing-wave-ratio bridge.

SWR meter—An external or built-in circuit that measures the standing-wave ratio at the transceiver end of the antenna transmission line.

SWTL—Abbreviation for surface-wave transmission line.

syllabic companding—Companding in which the effective gain variations are made at speeds allowing response to the syllables of speech but not to individual cycles of the signal wave.

syllable articulation—Also called percent of syllabic articulation. The percent of articulation obtained when the speech units considered are syllables (usually meaningless and usually of the consonant-vowel-consonant type).

symbol—1. A simplified design representing a part in a schematic circuit diagram. 2. A letter representing a particular quantity in formulas.

symbolic—1. Having to do with the representation of something by a conventional sign. 2. Represented by the usual alphanumeric symbols.

symbolic address—Also called a floating address. In digital-computer programming, a label chosen in a routine to identify a particular word, function, or other information independent of the location of the information within the routine.

symbolic code—Also called pseudocode. A code by which programs are expressed in source language; that is, storage locations and machine operations are

referred to by symbolic names and addresses that do not depend on their hardware-determined names and addresses. Contrasted with computer code.

symbolic coding—In digital computer programming, any coding system using symbolic rather than actual computer addresses.

symbolic debugger—A system software interactive debugging utility in which the debugging software has access to program symbol tables, and a programmer can refer to memory location names rather than absolute addresses. This is a valuable facility for use with relocatable code or paged systems in which task code may not be loaded at the same memory address each time it executes.

symbolic deck—A deck of cards punched in programmer coding language rather than binary language.

symbolic execution—Reconstructing the logic and actions along a program path via symbolic rather than actual data.

symbolic language—Human-oriented programming language. Any programming language prepared in coding other than a specific machine language, and which thus must be translated by compiling, assembly, etc.

symbolic-language programming—Also called assembly-language programming. The writing of program instructions in a language that facilitates the translation of programs into the binary code through the use of mnemonic convention.

symbolic layout editors—Software design tools that allow the designer to place symbols representing circuit elements (for example, transistors, logic gates, or even registers) instead of having to redesign them each time they are used.

symbolic logic—A special computer or control system language composed of symbols that the instrumentation can accept and handle. Combinations of these symbols can be fed in to represent many complex operations.

symbolic programming—A program using symbols instead of numbers for the operations and locations in a computer. Although the writing of a program is easier and faster, an assembly program must be used to decode the symbol into machine language and assign instruction locations.

symbol table—A table constructed by an assembler or compiler to bind symbolic labels to their actual addresses.

symmetrical—Balanced; i.e., having equal characteristics on each side of a central line, position, or value.

symmetrical alternating quantity—An alternating quantity for which all values separated by a half period have the same magnitude but opposite sign.

symmetrical avalanche rectifier—An avalanche rectifier that can be triggered in either direction. After triggering, it presents a low impedance in the triggered direction.

symmetrically cyclically magnetized condition—The condition of a cyclically magnetized material when the limits of the applied magnetizing forces are equal and of opposite sign.

symmetrical transducer (with respect to specified terminations)—A transducer in which all possible pairs of specified terminations can be interchanged without affecting the transmission.

symmetrical transistor—A transistor in which the collector and emitter are made identical, so either can be used interchangeably.

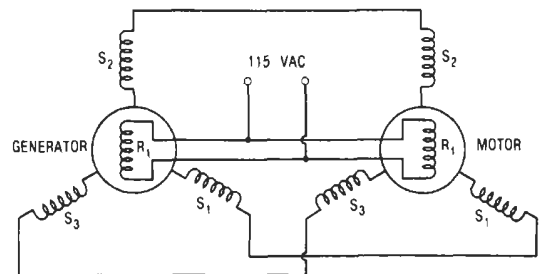
sync—1. Short for synchronous, synchronization, synchronizing, etc. 2. The maintenance of correct time relationships between events, i.e., synchronization.

syncable—Capable of being synchronized.

sync compression—1. The reduction in gain applied to the sync signal over any part of its amplitude range with respect to the gain at a specified reference level. 2. The reduction in the amplitude of the sync signal, with respect to the picture signal, occurring between two points of a circuit.

sync generator—1. An electronic device that supplies pulses to synchronize a television system. 2. A device for generating a synchronizing signal.

synchro—1. A small motorlike device containing a stator and a rotor and capable of transforming an angular-position input into an electrical output, or an electrical input into an angular output. When several synchros are correctly connected together, all rotors will line up at the same angle of rotation. 2. A range of ac electromechanical devices that are used in data transmission and computing systems. A synchro provides mechanical indication of its shaft position as the result of an electrical input, or an electrical output that represents some function of the angular displacement of its shaft. Such components are basically variable transformers. As the rotor of a synchro rotates it causes a change in synchro voltage outputs. Major types or classes of synchros include torque synchros, control synchros, resolvers, and induction potentiometers (linear synchro transmitters).



Synchro.

synchro control differential generator—A rotary component for modifying the synchro control generator output signal to correspond to the addition or subtraction from the generator shaft angle. Usually used with a synchro control generator and synchro control transducer.

synchro control generator—A rotary component for transforming the shaft angle to a corresponding set of electrical signals for ultimate retransformation to the shaft position in a remote location.

synchro control transformer—A rotary component that accepts signals from a generator or differential generator for reversion to the shaft angle with the aid of a servomechanism. Often used by itself as an angle-to-signal transducer, but usually with a synchro control generator and synchro control differential generator.

synchro differential generator—A synchro unit that receives an order from a synchro generator at its primary terminals, modifies this order mechanically by any desired amount according to the angular position of the rotor, and transmits the modified order from its secondary terminals to other synchro units.

synchro differential motor—A motor that is electrically similar to the synchro differential generator except that a damping device is added to prevent oscillation. Its rotor and stator are both connected to synchro generators, and its function is to indicate the sum of or difference between the two signals transmitted by the generators.

synchro generator—A synchro that has an electrical output proportional to the angular position of its rotor.

Synchroguide—A type of control circuit for horizontal scanning in which the sync signal, oscillator voltage pulse, and scanning voltage are compared and kept in synchronism.

synchro motor—A synchro in which the rotor-shaft position is dependent on the electrical input.

synchronism—1. The phase relationship between two or more quantities of the same period when their phase difference is zero. 2. Applied to the synchronous motor, the condition under which the motor runs at a speed that is directly related to the frequency of the power applied to the motor and is not dependent upon other variables.

synchronization—1. The precise matching of two waves or functions. 2. The process of keeping the electron beam on the television screen in the same position as the scanning beam at the transmitter. 3. In a carrier, that degree of matching in frequency between the carrier used for modulation and the carrier used for demodulation that is sufficiently accurate to permit efficient functioning of the system. 4. The maintenance of correct time relationships between events. Examples in recording include synchronization of sound and film for motion-picture use, synchronization of a slide-changing projector with a tape by means of signals recorded on the tape, and selective synchronization, used to synchronize several tracks when they are recorded one at a time.

synchronization error—In navigation, the error due to imperfect timing of two operations (may or may not include the signal transmission time).

synchronization mode—The level at which data on a communications link is synchronized. Start-stop mode denotes character-by-character synchronization; synchronous mode denotes frame-by-frame (or block level) synchronization.

synchronization pulses—Pulses originated by the transmitting equipment and introduced into the receiving equipment to keep the equipment at both locations operating in step.

synchronize—1. To adjust the periodicity of an electrical system so that it bears an integral relationship to the frequency of the periodic phenomenon under investigation. 2. To lock one element of a system into step with another. The term usually refers to locking a receiver to a transmitter, but it can refer to locking the data terminal equipment bit rate to the data set frequency. 3. In television, to maintain two or more scanning processes in phase.

synchronized sweep—A sweep that would free-run in the absence of an applied signal, but is synchronized by the presence of the signal.

synchronized waveforms—A condition whereby the timing of one waveform is related to the timing of another waveform.

synchronizer—1. The component of a radar set that generates the timing voltage for the complete set. *See also* timer. 3. 2. A computer storage device used to compensate for a difference in a rate of flow of information or time of occurrence of events when information is being transmitted from one device to another.

synchronizing-pulse selector—A circuit used to separate synchronizing pulses from commutated pulse trains.

synchronizing reactor—A current-limiting reactor that is connected momentarily across the open contacts of a circuit-interrupting device for synchronizing purposes.

synchro generator — synchronous demodulator

synchronizing relay—A relay that functions when two alternating-current sources are in agreement within predetermined limits of phase angle and frequency.

synchronizing separator—*See* amplitude separator.

synchronizing signal—*See* sync signal.

synchronous—1. In step or in phase, as applied to two devices or machines. 2. A term applied to a computer in which the performance of a sequence of operations is controlled by equally spaced clock signals or pulses. 3. Having a constant time interval between successive bits, characters, or events. The term implies that all equipment in the system is in step. 4. Operation of a switching network by a clock pulse generator. More critical than asynchronous timing but requires fewer and simpler circuits. 5. Describes modems, terminals, and transmissions in which all bits are of equal duration. Synchronous transmissions must always be associated with a clocking signal to keep the receiver and transmitter in step. 6. A communications protocol in which the data characters and bits are transmitted at a fixed rate with the transmitter and receiver synchronized. This eliminates the need for start-stop elements and provides greater transmission efficiency. 7. Term used to describe a device or system in which all events occur in a predetermined timed sequence.

synchronous booster converter—A synchronous converter connected in series with an ac generator and mounted on the same shaft. It is used for adjusting the voltage at the commutator of the converter.

synchronous capacitor—A rotating machine running without mechanical load and designed so that its field excitation can be varied in order to draw a leading current (like a capacitor) and thereby modify the power factor of the ac system or influence the load voltage through such change in power factor.

synchronous clock—An electric clock driven by a synchronous motor, for operation on an ac power system in which the frequency is accurately controlled.

synchronous communication—A method of transferring serial binary data between computer systems or between a computer system and a peripheral device; binary data is transmitted at a fixed rate, with the transmitter and receiver synchronized. Synchronization characters are located at the beginning of each message or block of data to synchronize the flow.

synchronous communications satellite—A communications satellite whose orbital speed is adjusted so that the satellite remains above a particular point on the surface of the earth.

synchronous computer—A digital computer in which all ordinary operations are controlled by clock pulses from a master clock.

synchronous converter—A synchronous machine that converts alternating current to direct current and vice versa. The armature winding is connected to the collector rings and commutator.

synchronous data communications—A serial I/O hardware protocol in which the transmitter and receiver are synchronized to a common clock signal.

synchronous demodulation—In a color television receiver, the process of separately detecting the I and Q sidebands of the color subcarrier system.

synchronous demodulator—Also called a synchronous detector. 1. A demodulator in which the reference signal has the same frequency as the carrier or subcarrier to be demodulated. It is used in color television receivers to recover either the I or the Q signals from the chrominance sidebands. 2. A double-balanced, full-wave demodulator. The basic operation is similar to that of the chroma demodulation system except that the

45.75-MHz reference carrier is generated inside of the IC rather than in a separate crystal oscillator referenced to burst signal as is done with the chroma. The only signals that are detected are the ones that are in phase with the demodulation signal produced by the carrier generator. Signals that are not synchronized with the IF carrier, such as the adjacent-channel video and sound carriers and random noise, are not detected. This requires less extensive trapping of interfering signals in earlier IF stages. 3. A detector sensitive to signals close to or at a particular frequency that is the same as the frequency of a control signal, applied independently. The synchronous detector is also phase-sensitive and is used in bridge and other null circuits as an antinoise device.

synchronous detector—See synchronous demodulator.

synchronous device—A device that transfers information at its own rate and not at the convenience of any interconnected device.

synchronous gate—A time gate in which the output intervals are synchronized with the incoming signal.

synchronous generator—A circuit designed to synchronize an externally generated signal with a train of clock pulses. The generator produces precisely one output pulse for each cycle of the input signal. The output pulse thus has a width equal to that of the period of the clock pulse train.

synchronous idle character—A communication control character used to provide a signal for synchronization of the equipment at the data terminals.

synchronous induction motor—A motor with the rotor laminations cut away, exposing the rotor and definite poles. Also, a motor that has definite poles, but the poles are permanent magnets. This term is also applied to a wound-rotor (slip-ring) motor that is started as an induction motor and, when near synchronism, has dc applied to two of the rings to operate as a true synchronous motor.

synchronous inputs—1. Those inputs of a flip-flop that do not control the output directly, as do those of a gate, but only when the clock permits and commands. Called J and K inputs or ac set and reset inputs. 2. Inputs to a flip-flop that affect the output only at the time the clock signal changes from a particular level to the other level.

synchronous inverter—See dynamotor.

synchronous logic—The type of digital logic used in a system in which logical operations take place in synchronism with clock pulses.

synchronous machine—1. A machine that has an average speed exactly proportionate to the frequency of the system to which it is connected. 2. A system whose operation is tied to data-independent timing or a system clock.

synchronous modem—A line-termination unit that uses a derived clocking signal to perform bit synchronization with incoming data.

synchronous motor—1. An induction motor that runs at synchronous speed. Its stator windings have the same arrangement as in nonsynchronous induction motors, but the rotor does not slip behind the rotating magnetic stator field. 2. Type of ac electric motor in which rotor speed is related directly to frequency of power supply. 3. A motor that runs at a speed in step with the power-station frequency (fundamental or harmonic of the alternator speed). Often started as an induction motor and converted to synchronous operation as it approaches synchronous speed. 4. An alternating-current motor that operates at a speed determined solely by the frequency

of the supply power and does not slow down as its load increases.

synchronous multiplexer—A multiplexer that can time-interleave two data streams into one higher-speed stream. In a system using these types of multiplexers, all peripheral equipment in the system must be under the control of a master synchronizing device or clock.

synchronous operation—Operation of a system under the control of clock pulses.

synchronous rectifier—A rectifier in which contacts are opened and closed at the correct instant by either a synchronous vibrator or a commutator driven by a synchronous motor.

synchronous shift register—Shift register that uses a clock for timing of a system operation and in which only one state change per clock pulse occurs.

synchronous speed—A speed value related to the frequency of an ac power line and the number of poles in the rotating equipment. Synchronous speed in revolutions per minute is equal to the frequency in hertz divided by the number of poles, with the result multiplied by 120.

synchronous system—1. A system in which the sending and receiving instruments are operating continuously at substantially the same frequency and are maintained in a desired phase relationship. 2. A system in which all events are synchronized by a common clock pulse.

synchronous torque—1. The maximum load torque with which a motor can be loaded after it comes to synchronous speed. These torques are usually higher than starting torques. 2. Torque that a synchronous motor develops after dc field excitation is applied; the total steady-state torque available to drive the load.

synchronous transfer—An I/O transfer that takes place in a certain amount of time without regard to feedback from the receiving device.

synchronous transmission—1. Data transmission in which characters and bits are transmitted at a fixed rate, with the transmitter and receiver synchronized by a clock source. This eliminates the need for individual start bits and stop bits surrounding each byte, thus providing greater efficiency. Compare with asynchronous transmission. 2. Transmission in which the sending and receiving instruments operate continuously at the same frequency and are held in a desired phase relationship by correction devices.

synchronous vibrator—An electromagnetic vibrator that simultaneously converts a low dc voltage to a low alternating voltage and applies it to a power transformer, from which a high alternating voltage is obtained and rectified. In power packs, it eliminates the need for a rectifier tube.

synchroscope—1. An instrument used to determine the phase difference or degree of synchronism of two alternating-current generators or quantities. 2. An oscilloscope on which recurrent pulses or waveforms may be observed, and which incorporates a sweep generator that produces one sweep for each pulse.

synchro system—A system for obtaining remote indication or control by means of self-synchronizing motors such as selsyns and equivalent types.

synchro-torque receiver—A relatively low-impedance positioning device that generates its own torque when driven by a suitable synchro-torque transmitter.

synchro-torque transmitter—A positioning device that generates electrical information of sufficient power to drive a suitable torque receiver.

synchrotron—A device for accelerating charged particles (e.g., electrons) in a vacuum. The particles are guided by a changing magnetic field while being

accelerated many times in a closed path by a radio-frequency electric field.

synchrotron noise—Radio noise caused by the acceleration of charged particles to high speeds.

synchrotron radiation—Also called magnetic bremsstrahlung. The radiation produced by relativistic electrons as they travel in a region of space containing magnetic fields.

sync level—The level of the peaks of the synchronizing signal.

sync limiter—A circuit used in television circuits to prevent sync pulses from exceeding a predetermined amplitude.

sync pulse—Part of the sync signal in a television system.

sync section—A color TV circuit comprising a keyer, burst amplifier, phase detector, reactance tube, subcarrier oscillator, and quadrature amplifier.

sync separator—The circuit that separates the picture signals from the control pulses in a television system.

sync signal—Also called a synchronizing signal. The signal employed for synchronizing the scanning. In television it is composed of pulses at rates related to the line and field frequencies.

sync-signal generator—A synchronizing signal generator for a television receiver or transmitter.

syntax—1. The rules that govern the structure of expressions in a language. 2. The grammar of a programming language, that is, rules about how commands may be used and how they fit together. 3. Set of grammatical rules defining valid constructs of a language. 4. Structure of expressions in a language and the rules governing the structure of a language. 5. The way in which words are put together to form valid computer commands.

synthesis—The combination of parts to form a whole.

synthesizer—1. A device that can generate a number of crystal-controlled frequencies for multichannel communications equipment. 2. A system for generating a precise and stable frequency whose accuracy is determined by quartz crystal oscillators, instead of inductance/capacitance tuned circuits. As compared with the latter, a synthesizer circuit can result in a tuner or transmitter whose frequency setting is known with great accuracy and that is free from drift or other tuning errors. True digital tuners (as opposed to those which tune conventionally but have digital frequency displays) use synthesizers in order to advance in discrete steps from one exact channel frequency to another without passing through the unwanted frequencies in between.

synthesizer frequency meter—A device for measuring frequency by utilizing a synthesized crystal-based signal for the internally generated signal.

synthetic display generation—Logical and numerical processing to display collected or calculated data in symbolic form.

synthetic speech—Artificially reproduced acoustic signals that are recognizable as human speech.

syntony—The condition in which two oscillating circuits have the same resonant frequency.

system—1. An assembly of component parts linked together by some form of regulated interaction into an organized whole. 2. A collection of consecutive operations and procedures required to accomplish a specific objective. 3. A collection of units combined to work a larger integrated unit having the capabilities of all the separate units. 4. The complete computer assembly, with CPU, memory, I/O, plus any required devices or peripherals for the application intended. 5. A set of interconnected

elements constituted to achieve a given objective by performing a specific function.

system analysis—The examination of an activity, procedure, method, technique, or business to determine what must be accomplished and how the necessary operations may best be accomplished by using electronic data-processing equipment.

systematic distortion—Distortion of a periodic or constant nature, such as bias or characteristic distortion; the opposite of fortuitous distortion.

systematic error—1. The magnitude and direction of the tendency of a measuring process to measure some quantity other than the one intended. 2. An error of the type that has an orderly character that can be corrected by calibration.

systematic inaccuracies—Those inaccuracies due to inherent limitations in the equipment.

system bus—A general-purpose backbone used to connect processors, memory, and peripherals to form a computer system.

system deviation—The instantaneous difference between the value of a specified system variable and the ideal value of the same system variable.

system effectiveness—A measure of the degree to which an item can be expected to fulfill a set of specified mission requirements, which may be expressed as a function of availability, dependability, and capability.

system element—One or more basic elements, together with other components necessary to form all or a significant part of one of the general functional groups into which a measurement system can be classified.

system engineering—A method of engineering analysis whereby all the elements in a system, including the process itself, are considered.

system failure rate—The number of occasions during a given time period on which a given number of identical systems do not function properly.

system ground—One common point to which the grounds for various pieces of equipment in a system are connected. The system ground is generally the best point to connect to earth ground.

system input unit—A device defined as a source of an input job stream.

system integration—The process of matching physical, electrical, and logical characteristics of different components so that they work together.

system layout—In a microwave system, a chart or diagram showing the number, type, and termination of circuits used in the system.

system library—The assemblage of all cataloged data sets at an installation.

system macroinstruction—A predefined macroinstruction that makes available access to operating system facilities.

system master tapes—Magnetic tapes that contain programmed instructions necessary for preparation of a computer before programs are run.

system network diagram—A diagram showing each station and its relationship to the other stations in a network of stations and to the control point(s).

system noise—The output of a system when it is operating with zero input signal.

system of beams—The three electron beams emitted by the triple electron-gun assembly in a color tube. They occupy positions equidistant from a common axis and are spaced 120° apart around the axis.

system of units—An assemblage of units for expressing the magnitudes of physical quantities.

system output unit—An output device that is shared by all jobs and onto which specified output information is transcribed.

system overshoot—The largest value of system deviation following the dynamic crossing of the ideal value as a result of a specified stimulus.

system reliability—The probability that a system will perform its specified task properly under stated conditions of environment.

system residence volume—The volume in which the nucleus of an operating system and the highest-level index of the catalog are located.

system resonance—The fundamental resonance of the woofer/enclosure combination. Related to the low-frequency performance of the systems, but not without ambiguity, especially when comparing different types of enclosures. Not to be confused with free-air resonance of the woofer.

systems analyst—A person skilled in solving problems with a digital computer. He or she analyzes and develops information systems.

systems-implementation languages—Essentially compilers with assemblerlike features. These allow the programmer to take advantage of compiler-level languages, but revert to assembler languages when necessary.

system software—1. Software that is intimately associated with the operating system, e.g., kernel routines,

system services, and system support software. 2. All the programs that tie together and coordinate the devices that make up the computer system. It includes such programs as loaders, compilers, interpreters, and input/output routines. 3. That collection of programs which controls the computer and helps people use the computer. Generally, supervisory and support modules, as opposed to application programs. This includes assemblers, editors, debuggers, operating systems, compilers, I/O drivers, loaders, and other utility programs. 4. A program that acts to assist the applications program and is usually not visible to the user. It takes the form of controlling and utilizing the internal resources of the computer. It keeps track of time, sequences, and events, and performs the input and output functions. This is the program that is used for general applications and, when made part of a memory medium such as disk, tape, semiconductor, or bubble memory, is referred to as the system firmware.

systems programs—Computer programs provided by a computer manufacturer. Examples are operating systems, assemblers, compilers, debugging aids, and input/output programs.

system support—Functions such as language translators, debugging tools, diagnostics, and libraries that enable a system user or programmer to write and test tasks in an efficient manner.

T

T—1. Symbol for transformer or absolute temperature. 2. Abbreviation for prefix *tera-* (10^{12}).

tab—1. *See* land. 2. 2. A nonprinting spacing action on a typewriter or tape preparation device, the code of which is necessary to the tab sequential format method of programming. 3. Term used to describe construction of wound capacitors whereby the two electrode foils, separated by dielectric, are positioned one above the other with a margin of dielectric completely surrounding the edges of both foils. Foil tabs, placed in the wound capacitor during winding, span the margin for connection to the leads.

table—1. A collection of data, each item of which is uniquely identified by a label, its position with respect to the other items, or some other means. 2. A set of data values.

table lookup—1. A computer technique that stores a table of data in a computer so that the data can be used during the running of the program. 2. In a computer, a method of controlling the location to which a jump or transfer is made. It is used especially when there is a large number of alternatives, as in function evaluation in scientific computations.

tablet—An input device that digitizes coordinate data indicated by stylus position.

tab sequential format—A means for identification of a computer word by the number of tab characters in the block preceding the word. The initial character in each word is a tab character. Words must be presented in a certain order, but all characters in a word except the tab character may be omitted when the command that word represents is not desired.

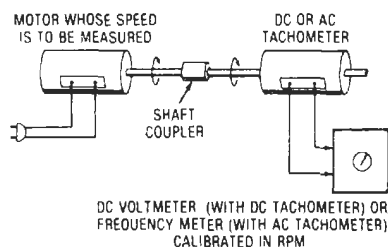
tabulate—1. To arrange data into a table. 2. To print totals.

tabulated cylinder—Translation of a curve along a direction line with upper and lower limits on the distance of translation.

tabulator—A machine (e.g., a punch-card machine) that reads information from one medium and produces lists, totals, or tabulations on separate forms or continuous paper strips.

tachometer—1. An instrument used to measure the frequency of mechanical systems by the determination of angular velocity. 2. A transducer that gives an electric output signal proportional to the rotational speed of a shaft. 3. A device for measuring rate by counting the number of pulses that occur in a given period. 4. An instrument designed to measure the rate of rotation of components such as shafts.

tachometer generator—A small generator attached to a rotating shaft for the purpose of generating a voltage proportional to the shaft speed. In speed-control circuits, a tachometer may be coupled to the shaft of the motor whose speed is to be controlled. A change of motor speed will produce a change of tachometer output voltage. This



Tachometer.

change of voltage can be used as an error signal to restore the speed to the desired value.

tacky state—The condition of a material when it exhibits an adhesive bond to another surface.

TACS—Abbreviation for Total Access Communication System. An analog cellular radio protocol used in the United Kingdom.

tactical—1. Of or relating to combat tactics. 2. Of or occurring at the battlefield. 3. Using or being weapons of force employed at the battlefield.

tactical air navigation—A short-range UHF air-navigation system that presents accurate information to a pilot in two dimensions, distance and bearing from a selected ground station.

tactical call sign—Call sign that identifies a tactical command or tactical communication facility.

tactical communications system—Systems that provide internal communications within tactical air elements, composed of transportable and mobile equipment assigned as unit equipment to the supporting tactical unit.

tactical frequency—Radio frequency assigned to a military unit to be used in the accomplishment of a tactical mission.

tag—1. A label attached to a piece of data in a data-flow computer that says where the data is to be used in a program. 2. Also called a sentinel. In digital-computer programming, a unit of information whose composition differs from that of other members of the set so that it can be used as a marker or label.

Tagged Image File Format—Abbreviated TIFF. A high-resolution bit-mapped graphics format for storing scanned images on IBM PCs and compatibles and Macintosh computers.

tail—1. A small pulse following the main pulse and in the same direction, or the slow decay following the main body of the pulse. 2. The free end of wire extending beyond the bond impression of a wire bond from the heel.

tail clipping—A method of sharpening the trailing edge of a pulse.

tailing—*See* hangover, 1.

tailor-made—Also called custom. Referring to a program or programs that are specially written for one particular task, for one set of people. Tailor-made software is usually commissioned by an individual customer, and not sold to anyone else.

tail pull—The act of removing the excess wire left when a wedge or ultrasonic bond is made.

tail pulse—A pulse in which the decay time is much longer than the rise time.

tails-out—1. Storage of a nonreversing tape on the takeup reel rather than on the supply reel, to avoid the tape-distorting interval winding stresses and uneven wind of high-speed rewinding. 2. In the case of reversing tapes (i.e., cassettes or four track open-reel tapes), storing the tape wound on whichever reel (or hub) it ends up on after having been played or recorded.

tail-warning radar set—A radar set placed in the tail of an aircraft to warn of aircraft approaching from the rear.

takeup reel—1. The reel that accumulates the tape as it is recorded or played on a tape recorder. 2. The reel on a tape recorder that is on the right side of the head stack and is empty prior to beginning the recording.

talbot—A unit of luminous energy in the mksa system equal to 1 lumen-second.

talk-back—A voice intercommunicator; an intercom.

talker echo—An echo that reaches the ear of the person who originated the sound.

talking battery—The dc voltage supplied by the central office to the subscriber's loop to operate the carbon transmitter in the handset.

talking path—The transmission path of a telephone circuit, making up the tip and ring conductors and the equipments connected to them.

talk-listen switch—A switch on an intercommunication unit to switch the speaker as required to function either as a reproducer or as a microphone.

talk-off—The tendency of a dual-tone multifrequency (DTMF) system to respond falsely to other-than-valid DTMF signals. Talk-off criteria are generally specified very subjectively—sometimes in such broad terms as “good” or “poor.”

tally light—Signal lights installed at the front and back of television cameras to inform performers and crew members when a particular camera is on the air.

tamper device—1. Any device, usually a switch, that is used to detect an attempt to gain access to intrusion alarm circuitry, such as by removing a switch cover. 2. A monitor circuit to detect any attempt to modify the alarm circuitry, such as by cutting a wire.

tamper switch—A switch that is installed in such a way as to detect attempts to remove the enclosure of some alarm system components, such as control box doors, switch covers, junction box covers, or bell housings. The alarm component is then often described as being “tampered.”

tandem—See cascade.

tandem office—In a telephone system, an office that interconnects the local end offices over tandem trunks in a densely settled exchange area where it is not economical to provide direct interconnection between all end offices. The tandem office completes all calls between the end offices but is not connected directly to subscriber's stations.

tandem transistor—Two transistors in one package and internally connected together.

tangent—A straight line that touches the circumference of a circle at one point.

tangent galvanometer—A galvanometer consisting of a small compass mounted horizontally in the center

of a large vertical coil of wire. The current through the coil is proportional to the tangent of the angle at which the compass needle is deflected.

tangential component—A component acting at right angles to a radius.

tangential pickup arm—A pickup arm that maintains the longitudinal axis of the stylus tangent to the record grooves throughout the entire movement of the arm across the record.

tangential sensitivity—A term generally applied as an indication of quality in a receiving system. This term can be used to define the minimum signal level that can be detected above the background noise. However, it is usually expressed as that signal power level that causes a 3-dB rise above the noise-level reading.

tangential sensitivity on look-through—The strength of the target signal, measured at the receiver terminals, required to produce a signal pulse having twice the apparent height or the noise.

tangential wave path—In radio-wave propagation of a direct wave over the earth, a path that is tangential to the surface of the earth. The tangential wave path is curved by atmospheric refraction.

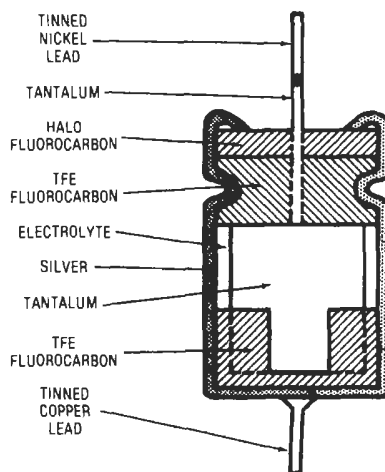
tangent of loss angle—The ratio of the equivalent series resistance and the capacitive reactance of a capacitor obtained at a sinusoidal alternating voltage of specified frequency.

tangent sensitivity—The slope of the line tangent to the response curve at the point being measured.

tank—1. A unit of acoustically operating delay-line storage containing a set of channels. Each channel forms a separate recirculation path. 2. See tank circuit, 2.

tank circuit—1. A circuit capable of storing electrical energy over a band of frequencies continuously distributed about a single frequency at which the circuit is said to be resonant or tuned. The selectivity of the circuit is proportionate to the ratio between the energy stored in the circuit and the energy dissipated. This ratio is often called the Q of the circuit. 2. Also called a tank. A parallel-resonant circuit connected in the plate circuit of an electron-tube generator.

tantalum (electrolytic) capacitor—An electrolytic capacitor with a tantalum foil or sintered-slug anode.



Tantalum capacitor.

tantalum-foil electrolytic capacitor—A capacitor that consists of two tantalum foil electrodes with an oxide on the anode, separated by layers of absorbent paper saturated with an operating electrolyte.

tantalum oxide—A dielectric material used in capacitors; it is formed electrochemically in a thin film on surfaces of tantalum metal.

T-antenna—Any antenna consisting of one or more horizontal wires, with the lead-in connected approximately in the center.

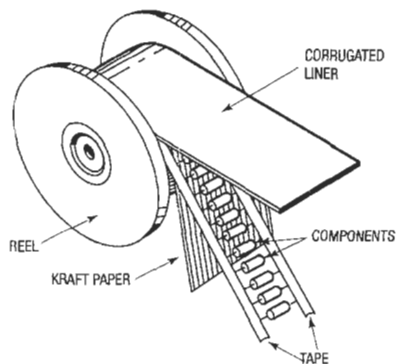
tap—1. A fixed electrical connection to a specified position on the element of a potentiometer, transformer, etc. 2. A branch. Applied to conductors, such as a battery tap, and to miscellaneous general use. 3. A connection of the terminal end of one conductor to another conductor at some point along its run; the process of making such a connection. Also, a connection or connection point brought out of a winding, as in a transformer, at some point between the ends of the winding, for controlling output ratios. 4. Connection on the phone line that lets a third party listen to what is being said in a telephone conversation.

tap center—A connection to the electrical midpoint of a coil, resistor, or transformer winding.

tap conductor—A conductor, usually short but longer than a pigtail, that serves to connect utilization equipment to the serving circuit.

tap crystal—A compound semiconductor that stores current when stimulated by light and then gives up energy in the form of flashes of light when subjected to mechanical tapping.

tape—1. Plastic ribbons with one side coated metallically to receive impressions from a recording head, or, if already recorded, to induce signals in a playback head. Tape is regularly wound on reels or packaged in magazines or cartridge form. 2. See punched tape. 3. A ribbon of flexible material—e.g., friction, magnetic, punched, etc. 4. A strip of material, which may be punched, coated, or impregnated with magnetic or optically sensitive substances, used for data input, storage, or output. The data is stored serially in several channels across the tape transversely to the reading or writing motion. Tape has a far higher storage capacity than disk storage of similar volume, but it takes much longer to write or recover data to tape than to disk.



Tape-and-reel packaging.

tape cable—Also called flat flexible cable. A form of flexible multiple conductor in which parallel strips of metal are imbedded in an insulating material.

tape cartridge—A magazine or holder for a length of magnetic tape that by its design avoids the necessity for manual threading or handling. Usually compatible only with one specific type of machine. See also tape magazine.

tape character—Information consisting of bits stored across the several longitudinal channels of a tape.

tape-controlled carriage—A paper-feeding device automatically controlled by a punched paper tape.

tape copy—A message received in tape form as the result of a transmission.

tape deck—1. The basic assembly of a tape recorder, consisting of the tape-moving mechanism (the tape transport) and a head assembly. Some decks also include recording and playback preamplifiers; these properly are called tape recorders. Some have playback-only preamplifiers; these have no standard name but are often called tape players. 2. A tape recorder that does not include power amplifiers or speakers.

tape distributor—A machine that reads prerecorded paper tape.

tape drive—1. A mechanism for moving tape past a head; tape transport. 2. The motor and associated mechanism that pulls the tape past the playing or recording heads.

tape feed—A mechanism that feeds the tape to be read or sensed by a computer or other data-handling system.

tape guides—Grooved pins of nonmagnetic material mounted at either side of the recording-head assembly. Their function is to position the magnetic tape on the head as it is being recorded or played.

tape head—The transducer on a tape recorder past which the tape runs during record or replay. It applies a magnetic field to the tape during the recording process and provides electrical output during replay.

tape hiss—Sibilant background noise heard when a tape is played. Although some of this noise is directly attributable to irregularities of the oxide coating, some also is contributed by the recording circuitry.

tape lifters—A system of movable guides that automatically divert tape from contact with the recorder heads during the fast forward or rewinding mode of operation, thus preventing head wear.

tape limited—Pertaining to a computer operation in which the time required for the reading and writing of tapes is greater than the time required for computation.

tape loop—A length of magnetic tape with the ends joined together to form an endless loop. Used either on a standard recorder, a special message-repeater unit, or in conjunction with a cartridge device, it enables a recorded message to be played back repetitively; there is no need to rewind the tape.

tape magazine—Also called a tape cartridge. A container holding a reel of magnetic recording tape, which can be played without being threaded manually.

tape mark—A special record indicating end of file.

tape monitor—1. A circuit that permits the checking of recordings by taking the signal directly from the tape a moment after the recording is made. This is only possible on three-head recorders. 2. An interruption in the signal path of a preamplifier, from which the selected input signal is supplied to an external tape recorder, and to which the playback output of the recorder is returned for further amplification and processing. Tape monitor circuits allow one to listen to a tape as it is recorded, ensuring it is being recorded properly. They also allow the use of external signal processing devices such as equalizers, noise reducers, and expanders, and are sometimes known as external processor loops for that reason.

tape-on surface-temperature resistor—A surface-temperature resistor installed by adhering the

sensing element to the surface with a piece of pressure-sensitive tape.

tape parity—Parity error that occurs when information is transferred to or from magnetic tape.

tape-path center line—The locus or path traced by an imaginary point, located on the recording tape midway between its edges, as it travels from reel-to-reel through guides, past heads, and between capstan and pressure rollers. For correct tracking and minimum tape distortion, the entire path should lie in a single plane located above the motor board at a height compatible with head-gap locations.

tape perforator—A device that records a teletype-writer or data message by punching holes in paper tape, under control of either a local keyboard or an incoming signal.

tape phonograph—See tape player.

tape player—Sometimes called a tape phonograph or a tape reproducer. A unit for playing recorded tapes. It has no facilities for recording.

tape punch—A peripheral device that generates (punches) holes in a paper tape to produce a hard copy of PC memory contents.

taper—In communication practice, a continuous or gradual change in electrical properties with length—e.g., as obtained by a continuous change of cross section of a wavelength or by the distribution and change of resistance of a potentiometer or rheostat.

tape reader—1. A peripheral device for converting information stored on punched paper tape to electrical signals for entry into PC memory. 2. A unit that is capable of sensing data from punched tape.

tape recorder—A mechanical-electronic device for recording voice, music, and other audio-frequency material. Sound is converted to electrical energy, which in turn sets up a corresponding magnetic pattern on iron oxide particles suspended on paper or plastic tape. During playback, this magnetic pattern is reconverted into electrical energy and then changed back to sound through the medium of headphones or a speaker. The recorded material may be converted to a visual display by the use of an oscilloscope, other visual indicator, or a graphic recorder. See also videotape recording.

tapered potentiometer—A continuously adjustable potentiometer whose resistance varies nonuniformly along the element, being greater or less for equal slider movement at various points along the resistance element.

tapered transmission line—See tapered waveguide.

tapered waveguide—Also called a tapered transmission line. A waveguide in which a physical or electrical characteristic changes continuously with distance along the axis of the guide.

tape relay—A method in which perforated tape is used as the intermediate storage in the process of relaying messages between transmitting and receiving stations.

tape-relay station—A component of a communications center that carries out the function of receiving and forwarding messages by means of tape relay.

tape reproducer—See tape player.

tape reservoir—That part of a magnetic tape system used to isolate the tape storage inertia (i.e., tape reels, etc.) from the drive system.

taper pin—A pin-type contact having a tapered end designed to be inserted into a tapered hole.

tape skew—The deviation of a tape from following a linear path when transported across the heads, causing a time displacement between signals recorded on different tracks and amplitude differences between the outputs from

individual tracks owing to variations in azimuth alignment. The adjectives *static* and *dynamic* are used to distinguish between the steady and fluctuating components of the tape skew.

tape speed—The speed at which tape moves past the head in the recording or playback mode. The standard tape speed for home use is $7\frac{1}{2}$ ips (19.05 cm/s) or half this speed ($3\frac{3}{4}$ ips). One-fourth or even one-eighth this speed is also used, but usually only for music when special high-quality tape is utilized. The professional recording speed for music mastering is usually 15 ips (38.1 cm/s).

tape-speed errors—Any variation in tape speed from the normal speed over the record or reproduce head, regardless of cause.

tape-speed variations—See flutter, 1.

tape splicer—A device for splicing magnetic tape automatically or semiautomatically.

tape station—See tape unit.

tape threader—A device that makes easier the threading of magnetic recording tape onto the reel.

tape-to-card—Pertaining to equipment or methods used to transfer data from magnetic or punched tape to punched cards. (No longer in use.)

tape-to-head speed—The relative speed of the tape and head during normal recording or replay. (The tape-to-head speed coincides with the tape speed in conventional longitudinal recording, but it is considerably greater than the tape speed in systems where the heads are scanned across or along the tape.)

tape-to-tape converter—A device for changing from one form of input/output medium or code to another, i.e., magnetic tape to paper tape (or vice versa) or eight-channel code to five-channel code.

tape transmitter—1. A machine actuated by previously punched paper tape and used for high-speed code transmission. 2. A facsimile transmitter designed for transmission of subject copy printed on narrow tape.

tape transport—See transport.

tape-transport mechanism—See motor board.

tape unit—Also called tape station. A device that contains a tape drive and the associated heads and controls.

tape-wound core—Also known as bimag. A magnetic core consisting of a plastic or ceramic toroid around which is wound a strip of thin magnetic tape possessing a square hysteresis-loop characteristic. A tape-wound core is used principally as a shift-register element.

tap lead—The lead connected to a tap on a coil winding.

tapped control—A rheostat or potentiometer having a fixed tap at some point along the resistance element, usually to provide fixed grid bias or automatic tone compensation.

tapped line—A delay line in which more than two terminal pairs are associated with a single sonic-delay channel.

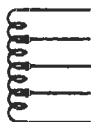
tapped resistor—A wirewound fixed resistor having one or more additional terminals along its length, generally for voltage-divider applications.

tapped winding—A coil winding with connections brought out from turns at various points. See figure on page 763.

tapper bell—A single-stroke bell designed to produce sound of low intensity and relatively high pitch.

tap switch—A multicontact switch used chiefly for connecting a load to any one of a number of taps on a resistor or coil.

target—1. In a camera tube, a structure employing a storage surface that is scanned by an electron beam to generate an output-signal current corresponding to the charge-density pattern stored thereon. 2. Also called an



Tapped winding.

anticathode. In an X-ray tube, an electrode or part of an electrode on which a beam of electrons is focused and from which X-rays are emitted. 3. In radar, a specific object of radar search or surveillance. 4. Any object that reflects energy back to the radar receiver. 5. In image pickup tubes, a structure employing a storage surface that is scanned by an electron beam to generate a signal output current corresponding to a charge-density pattern stored thereon. The structure may include the storage surface that is scanned by an electron beam, the backplate, and the intervening dielectric.

target acquisition—In radar operation, the first appearance of a recognizable and useful signal returned from a new target.

target capacitance—In camera tubes, the capacitance between the scanned area of the target and backplate.

target cutoff voltage—In camera tubes, the lowest target voltage at which any detectable electrical signal, corresponding to a light image on the sensitive surface of the tube, can be obtained.

target discrimination—The characteristic of a guidance system that permits it to distinguish between two or more targets in close proximity.

target fade—The loss or decrease of signal from the target due to interference or other phenomena.

target glint—*See* scintillation, 2.

target identification—A visual procedure by which a radar target is positively identified as either hostile or friendly.

target integration—A system of increasing the sensitivity of a TV camera when viewing a static scene by cutting off the beam for a predetermined number of frames and reading out the information in the first frame after beam turn-on.

target language—The language into which some other language is to be properly translated. In computers, any language (such as object code) into which another language (such as source code) is translated.

target noise—Reflections of a transmitted radar signal from a target that has a number of reflecting elements randomly oriented in space.

target reflectivity—The degree to which a target reflects electromagnetic energy.

target scintillation—The apparent random movement of the center of reflectivity of a target observed during the course of an operation.

target seeker—In a missile homing system, the element that senses some feature of the target so that the resulting information can be used to direct appropriate maneuvers to maintain a collision course.

target signature—The characteristic pattern of a given target when displayed by detection and classification equipment.

target system—1. The computer that is being emulated on another system. 2. The microcomputer under development: the prototype.

target voltage—In a camera tube with low-velocity scanning, the potential difference between the thermionic cathode and the backplate.

tariff—The published rate for utilization of a specific unit of equipment, facility, or type of service provided by a communications common carrier. Also the vehicle by which the regulating agency approves or disapproves such facilities or services. Thus, the tariff becomes a contract between customer and common carrier.

task—1. A unit of work for the central processing unit as determined by the control program; therefore, the basic multiprogramming unit under the control program. 2. A software module in which code is executed in a sequential manner.

task control block—The consolidation of the control information that has to do with a task.

task dispatcher—The control-program function that selects a task from the task queue and gives control of the central processing unit to that task.

tasking—The capability of a computer to process more than one set of instructions, or task, at a time.

task list—A system data structure containing a list of tasks within the system.

task management—Those functions of the control program by which the use of the central processing unit and other resources by tasks is regulated.

task queue—A queue that contains control information for all tasks in a system at any given time.

task state—The status of a task; it may be undefined, ready to execute, executing, or suspended awaiting some event.

taut-band galvanometer—A galvanometer whose moving coil is suspended between two taut ribbons.

taut-band suspension—In an indicating instrument, a mechanical arrangement in which the moving element is suspended by means of a thin, flat conducting ribbon at each end. The ribbons normally are in tension sufficient to maintain the lateral motion of the moving element within limits that permit the freedom of useful motion for any mounting position of the instrument. A restoring torque is produced within the ribbons when the moving element rotates.

TBC—Abbreviation for time base corrector. A device that corrects time base stability errors (errors in the rate at which a signal is occurring) during tape playback.

TC—1. Abbreviation for teleconferencing. The use of telecommunications to link physically separated individuals or groups for purposes of holding a meeting. The technology can range from a simple speakerphone to elaborate custom-designed teleconference rooms equipped with two-way audio, graphics, and video. *See also* teleconference. 2. Abbreviation for temperature coefficient.

T carrier—A time-division-multiplexed service, normally supplied by the telephone company, that usually operates a digital transmission facility at an aggregate data rate of 1.544 Mbps and above.

TC capacitor—Abbreviation for temperature-compensating capacitor.

Tchebychev filters—Filter networks that are designed to exhibit a predetermined ripple in the passband (ripple amplitudes from 0.01 dB to 3 dB are common) in exchange for which they provide a more rapid attenuation above cutoff—which, unlike their passband response, is monotonic.

Tchebychev function—A mathematical function whose curve ripples within certain bounds (*See* ripple, 2). This produces an amplitude response more square than that of the Butterworth function, but with less desirable phase and time-delay characteristics. There is an entire family of Tchebychev functions (0.1 ripple, 0.5 ripple, etc.).

T-circulator—A circulator consisting of three identical rectangular waveguides joined asymmetrically to form

a T-shaped structure, with a ferrite post or wedge at the center of the structure. Power that enters any waveguide emerges from only one adjacent waveguide.

TCR—Abbreviation for temperature coefficient of resistance.

TDD/TTY—Acronym for tone dialing for the deaf/teletype. A method by which the hearing impaired can type messages over normal phone lines using special equipment.

TDM—See time-division multiplexing.

TDMA—Abbreviation for time division multiple access. A method of sharing a transmission medium by dividing the time into "slots" and allocating those slots to users on a network.

TDR—Abbreviation for time-delay relay.

teach box—A hand-held control with which a robot can be programmed.

tearing—Distortion observed on the television screen when the horizontal synchronization is unstable. Groups of horizontal lines are displaced in an irregular manner, creating the appearance of parts of the image having been torn away.

teaser transformer—A transformer of two T-connected, single-phase units for three-phase to two-phase or two-phase to three-phase operation; it is connected between the midpoint of the main transformer and the third wire of the three-phase system.

teasing—In the life testing of switches, the slow movement of rotor contacts making and breaking with stator contacts.

technical control board—In a switch center or relay station, a testing position at which there are provisions for making tests on switches and associated access lines and trunks.

technical load—The portion of the operational power load of a facility that is required for communications-electronics, tactical-operations, and ancillary equipment. It includes power for lighting, air conditioning, or ventilation necessary for full continuity of communications-electronics operation.

technician—A person who works directly with scientists, engineers, and other professionals in every field of science and technology. Technicians' duties vary greatly, depending on their field of specialization. But in general, the scientist or engineer does the theoretical work, and the technician translates theory into action.

technician license—A class of amateur radio license issued in the United States by the FCC for the primary purpose of operation and experimentation on frequencies above 50 MHz.

technology—1. To organize the means for satisfying needs and desires. 2. Know-how applied to get a job done.

tecnetron—A high-power multichannel field-effect transistor similar to a triode tube in that it has anode and cathode connections on opposite ends of a small germanium rod (and a grid connection between them).

TED—Abbreviation for transferred electron device. A gate-controlled, Gunn-effect unit. The triode TED consists of an anode, cathode, and Schottky barrier gate. The device resembles a Gunn diode. It has a threshold and a negative-resistance region that produces oscillation at the transit-time frequency, which depends on the anode-cathode spacing.

tee junction—Also spelled T-junction. A junction of waveguides in which the longitudinal guide axes form a T. The guide that continues through the junction is called the main guide; the one that terminates at a junction, the branch guide.

telautograph—Also called a telewriter. A writing telegraph instrument in which the movement of a pen in the transmitting apparatus varies the current and thereby

causes the corresponding movement of a pen at the remote receiving instrument.

tele-—A prefix, from Greek, that means distant or at a distance.

telecamera—Abbreviation for a television camera.

telecardiophone—An amplifying stethoscope that permits heart sounds to be heard at a distance.

telecast—Abbreviation for television broadcasting—specifically, a television program, or the act of broadcasting a television program.

telecasting—The broadcasting of a television program.

telecommand—One-way transmission to modify, initiate, or terminate functions of a device at a distance.

telecommunication—1. All types of systems in which electric or electromagnetic signals are used to transmit information between or among points. Transmission media may be radio, light, or waves in other portions of the electromagnetic spectrum; wire, cable; or any other medium. 2. Data transmission between a computing system and remotely located devices via a unit that performs the necessary format conversion and controls the rate of transmission. 3. Pertaining to the art and science of telecommunication. 4. Any transmission, emission, or reception of signs, signals, writing, images, or sounds, or intelligence of any nature by wire, radio, visual, or other electromagnetic systems. 5. Generally refers to the reception and/or transmission of information—whether in digital or analog form—by telephone, telegraph, and the like. 6. The transmission/reception between terminals, or between terminals and computers, of (digitized) information or messages over telephone lines or by wireless transmission. 7. Communication by electrical transmission, such as television, radio, telephone and telegraph, that is carried over a distance. 8. The conversion and transmission of information from a computer to another device at a distance. 9. The process of moving data from one point to another. 10. Synonym for data communication. The transmission of information from one point to another.

telecommunication lines—Telephone and other communication lines that are used to transmit messages from one location to another.

teleconference—1. A conference between persons who are remote from one another but linked together by a telecommunications system. 2. Electronically linked meeting conducted among groups of people in geographically separated locations. Three forms of teleconference currently exist. A typical video mode includes an audio system, a facsimile device, and a storage unit for the display of prepared material. An audio teleconference lacks live-video capability but nonetheless usually utilizes graphic-display equipment. In a computer teleconference, data is transmitted by keyboard and then printed out. 3. A meeting conducted via telephone lines between two or more groups of individuals who are physically separated. It provides a low-cost technique of bringing people together via telephone channels and also overcomes problems imposed by distance and time.

telegenic—The suitability of a subject or model for televising.

telegram—Any written matter that is transmitted by telegraphy.

telegraph—1. A system that employs interruptions or polarity changes of direct current for the transmission of signals. 2. A system of communication using coded signals.

telegraph channel—1. The transmission media and intervening apparatus involved in the transmission of telegraph signals in a given direction between two intermediate telegraph installations. A means of one-way transmission of telegraph signals. 2. A communication

path that is suitable for transmitting telegraph signals between two points. The required bandwidth depends on the signaling speed.

telegraph circuit—A complete circuit over which signal currents flow between transmitting and receiving apparatus in a telegraph system. It sometimes consists of an overhead wire or cable and a return path through the ground.

telegraph concentrator—A switching arrangement by means of which a number of branch or subscriber lines or station sets may be connected to a lesser number of trunk lines, operating positions, or instruments through the medium of manual or automatic switching devices to obtain more efficient use of facilities.

telegraph distributor—A device that effectively associates one direct current or carrier telegraph channel in rapid succession with the elements of one or more signal-sending or signal-receiving devices.

telegraph-grade circuit—A circuit suitable for transmission by teletypewriter equipment. Normally the circuit is considered to employ dc signaling at a maximum speed of 75 bauds.

telegraph key—A single-pole, single-throw switch that can be rapidly operated by hand so as to form the dots and dashes of telegraph code signals by opening and closing contacts to modulate current.

telegraph-modulated waves—Continuous waves whose amplitude or frequency is varied by means of telegraphic keying.

telegraph repeater—Apparatus that receives telegraph signals from one line and retransmits corresponding signals on another line.

telegraph selector—A device that performs a switching operation in response to a definite signal or group of successive signals received over a controlling circuit.

telegraph signal distortion—The time displacement of transitions between conditions, such as marking and spacing, with respect to their proper relative positions in perfectly timed signals. The total distortion is the algebraic sum of the bias and the characteristic and fortuitous distortions.

telegraph sounder—A telegraph receiving instrument in which an electromagnet attracts an armature each time a pulse arrives. This armature makes an audible sound as it hits against its stops at the beginning and end of each current impulse, and the intervals between these sounds are translated from code into the received message by the operator.

telegraph transmission speed—The rate at which signals are transmitted. This may be measured by the equivalent number of dot-cycles per second or by the average number of letters or words transmitted and received per minute.

telegraph transmitter—A device for controlling a source of electric power in order to form telegraph signals.

telegraph wave—A completely random two-level signal.

telegraphy—1. A system of telecommunication for the transmission of graphic symbols, usually letters or numerals, by the use of a signal code. It is used primarily for record communication. 2. Any system of telecommunication for the transmission of graphic symbols or images for reception in record form, usually without gradation of shade values. 3. The science of communicating at a distance by means of coded current pulses sent over wire circuits.

telemicrocardiograph—A device for transmission and remote reception of electrocardiograph signals.

telematics—Also called *telematique*. 1. A capability in telecommunications, computers, and semiconductors.

telegraph circuit — telephone carrier current

2. The integration of computer-processing applications with telecommunications capabilities.

telemeter—1. To transmit analog or digital reports of measurements and observations over a distance (e.g., by radio transmission from a guided missile to a control or recording station on the ground). 2. A complete measuring, transmitting, and receiving apparatus for indicating, recording, or integrating the value of a quantity at a distance by electric translating means.

telemetry—A measurement accomplished with the aid of intermediate means that allow perception, recording, or interpretation of data at a distance from a primary sensor. The most widely employed interpretation of telemetry restricts its significance to data transmitted by means of electromagnetic propagation.

telemeter service—Metered telegraph transmission between paired telegraph instruments over an intervening circuit adapted to serve a number of such pairs on a shared-time basis.

telemetry—1. The science of sensing and measuring information at some remote location and transmitting the data to a convenient location to be read and recorded. 2. The transmission of measurements obtained by automatic sensors and the like over communications channels. 3. The practice of transmitting and receiving the measurement of a variable for readout or other uses. The term is most commonly applied to electric signal systems. 4. Transmission and collection of data obtained by sensing conditions in a real-time environment. 5. Transmission of coded analog data, often real-time parameters, from a remote site.

telemetry beacon—A system whereby two or more reply pulses are transmitted by the beacon for the transmission of data from the test vehicle to the ground station.

telemetry cable—Cable used for the transmission of information from instruments to the peripheral recording equipment.

telemetry frame—In PCM systems, one complete sampling of words or channels of information at a given rate; in time-division multiplexing, one complete commutator revolution.

telemetry frame rate—The frequency derived from the period of one frame.

teleoperator—A mobile robot controlled by a human operator. Teleoperators are most often used in areas that would be hazardous to human beings.

telephone—Combination of apparatus for converting speech energy into electrical waves, transmitting the electrical energy to a distant point, and there reconverting the electrical energy to audible sounds.

telephone address—The complete 10-digit number that specifies the location of a particular telephone. Consists of a 3-digit area code, a 3-digit central office code, plus a 4-digit station number.

telephone answering machine—A device that answers a telephone in the subscriber's absence, plays a recorded message, and then records messages from callers before disconnecting. When the subscriber returns he or she can rewind and play back all messages recorded in his or her absence, or the subscriber can interrogate the telephone answering machine remotely by sending appropriate tones from another telephone and then listening to the recorded messages.

telephone capacitor—A fixed capacitor connected in parallel with a telephone receiver to bypass rf and higher audio frequencies and thereby reduce noise.

telephone carrier current—A carrier current used for telephone communication so that more than one channel can be obtained on a single pair of wires.

telephone central office—A switching unit, installed in a telephone system that provides service to the general public, that has the necessary facilities for terminating and interconnecting lines and trunks.

telephone channel—1. A channel suitable for the transmission of telephone signals. 2. A communication path suitable for carrying voice message traffic between two points.

telephone circuit—A complete circuit over which audio and signaling currents travel between two telephone subscribers communicating with each other in a telephone system.

telephone company—Any common carrier providing public telephone system service. There are about 2500 telephone companies in the United States.

telephone current—An electric current produced or controlled by the operation of a telephone transmitter.

telephone instrument—A subscriber's complete telephone set.

telephone jack—*See* phone jack.

telephone network—The arrangement of trunks, subscriber lines, centralized switching locations, etc., used to switch calls and make connections between various customers.

telephone number—In the United States, a seven-digit number assigned to a telephone. It contains a three-digit central office code.

telephone pickup—Any of several devices used to monitor telephone conversations, usually without direct connection to the telephone line and operating on the principle of mutual magnetic coupling.

telephone plug—*See* phone plug.

telephone receiver—The portion of the telephone instrument held closely to the human ear that converts the analog electrical speech signal into sound waves.

telephone relay—1. A relay used in telephone system switching equipment. 2. Any high-density, multipole relay intended for signal level switching in communications and data processing. These relays may have self-wiping contacts, that is, bifurcated pole blades that scrape over mating surfaces to remove minor oxide buildup.

telephone repeater—An assemblage of amplifiers and other equipment employed at points along the line to rebuild the signal strength in a telephone circuit.

telephone ringer—An electric bell that operates on low-frequency alternating or pulsating current and is used for indicating a telephone call to a station being alerted.

telephone system—A group of telephones plus the lines, trunks, switching mechanisms, and all other accessories required to interconnect the telephones.

telephone transmitter—1. A microphone used in a telephone system. *See also* microphone. 2. A transducer that uses voice sound pressure on a diaphragm to translate the acoustic message into an analog electrical signal.

telephone wire—A general term referring to many different types of communication wire. It refers to a class of wires and cables, rather than a specific type.

telephony—1. The transmission of speech current over wires, enabling two persons to converse over almost any distance. 2. A telecommunications system for transmitting speech or other sounds.

telephoto—Also called telephotography. A photoelectrical transmission system for point-to-point or air-to-ground transmission of high-definition pictorial information.

telephotography—*See* telephoto.

telephoto lens—A lens system that is physically shorter than its rated focal length. It is used in still, movie, and television cameras to enlarge images of objects photographed at comparatively great distances.

telepoint—A cordless telephone system in which a subscriber can make but not receive phone calls in public areas that have been equipped with telepoint base stations. The system is not mobile—the user must remain essentially in a fixed location throughout the duration of the call. Both service and equipment are less expensive than cellular.

teleprinter—1. *See* printer, 1. 2. Trade name used by Western Union for its telegraph terminal equipment. 3. *See* teletypewriter.

teleprocessing—1. A form of information handling in which the data-processing system operates in conjunction with communication facilities (originally a trademark of International Business Machines Corp.). 2. The processing of data that is received from or sent to remote locations by way of telecommunication lines. Such systems are essential to hook up remote terminals or connect geographically separated computers.

teleprompter—A device mounted on the front of a camera that projects copy on a semireflective mirror placed directly in front of the lens so the performer can read lines while appearing to look at the camera.

teleran—A navigational system in which radar and television transmitting equipment are employed on the ground, with television receiving equipment in the aircraft, to televise the image of the ground radar PPI scope to the aircraft along with map and weather data.

telering—A frequency-selector device for the production of ringing power.

teleroobotics—Remote operation systems that mimic human movements through machinery.

telesis—Progress intelligently planned and directed; the attainment of desired ends by the application of intelligent human effort to the means.

telesynd—Telemeter or remote-control equipment that is synchronous in both speed and position.

Teletype—1. A trademark of Teletype Corporation for a series of teleprinter equipment such as tape punches, reperforators, page printers, etc., used in communications systems. Now often incorrectly used as a generic term to indicate any similar piece of equipment. 2. A peripheral electromechanical device for inserting or recording a program into or from a PC memory in either a punched paper tape or printed ladder diagram format.

teletypewriter—Also known as a teleprinter. 1. *See* printer, 1. 2. A generic term referring to the basic equipment made by Teletype Corporation and to teleprinter equipment. The teletypewriter uses electromechanical functions to generate codes (Baudot) in response to a human input to a manual keyboard. 3. A keyboard machine that can transmit and receive alphabetical, numerical, and certain control (nonprinting) characters as a train of pulses on two wires. Attachments can be fitted for punching paper tape and printing on a roll of paper at the same time, also for reading tape and printing the message that is read. 4. A keyboard printing unit that is often used to enter information into a computer and to accept output from a computer. The widest usage of the teletypewriter is as an input/output device in minicomputer systems, a remote terminal in a time-sharing system, and an operator console for computer systems.

teletypewriter code—A special code in which each code group is made up of five units, or elements, of equal length that are known as marking or spacing impulses. The five-unit start-stop code consists of five signal impulses preceded by a start impulse and followed by a stop impulse. Each impulse except the stop impulse is 22 milliseconds in length; the stop impulse is 32 milliseconds (based on 60-word-per-minute operation).

teletypewriter exchange service—1. A commercial service that provides teletypewriter communication on the same basis as telephone service, through central switchboards to stations in the same city or other cities. 2. Abbreviated TWX. A public teletypewriter exchange (switched) service in the United States and Canada formerly owned by AT&T but now belonging to Western Union. Baudot and ASCII-coded machines are used.

teletypewriter signal distortion—With respect to a stop-start teletypewriter signal, a shift of the transition points of the signal pulses from their proper positions in relation to the beginning of the start pulse. The magnitude of the distortion is expressed as a percentage of a perfect unit pulse length.

teletypewriter switching system—A total message switching system whose terminals are teletypewriter equipment.

teletypewriter test tape—A tape perforated so that it contains the identification of the transmitting station followed by repetitions of the letters RY and a test that consists of letters and figures.

televise—The act of converting a scene or image field into a television signal for transmission.

television—Abbreviated TV. 1. A telecommunication system for transmission of transient images of fixed or moving objects. 2. A system for converting visual images into electrical signals that can be transmitted (by radio or wire) to distant receivers, where the signals are reconverted to the original visual images and displayed on a CRT.

television and radar navigation—A navigational system that (a) employs ground-based search radar

equipment along an airway to locate aircraft flying near that airway; (b) transmits, by television means, information pertaining to these aircraft and other information to the pilots of properly equipped aircraft; and (c) provides information to the pilots appropriate for use in the landing approach.

television bandwidth—The range of frequencies within which a television broadcast transmission must fall, generally assigned to be from 54 to 890 MHz.

television broadcast band—The frequencies assignable to television broadcast stations in the band extending from 54 to 806 MHz. These frequencies are grouped into channels, as follows: channels 2 through 4, 54 to 72 MHz; channels 5 and 6, 76 to 88 MHz; channels 7 through 13, 174 to 216 MHz; and channels 14 through 69, 470 to 806 MHz.

television broadcast station—A radio station for transmitting visual signals, and usually simultaneous aural signals, for general reception.

television camera—Abbreviated TV camera. A camera that contains an electronic image tube in place of a photographic film. The image formed on the tube face by a lens is scanned rapidly by a moving electron beam. The beam current varies with the local brightness of the image, which is transmitted to the viewer's set, where it controls the brightness of the scanning spot in a cathode ray tube. The scanning spots at the camera and the viewing tube must be accurately synchronized.

television channel—A band of frequencies 6 megahertz wide in the television broadcast band, assigned to television broadcasting stations. The channel for associated sound signals may or may not be considered part

Television channels

Channel number	Band (megahertz)	Channel number	Band (megahertz)	Channel number	Band (megahertz)
2	54–60	29	560–566	57	728–734
3	60–66	30	566–572	58	734–740
4	66–72	31	572–578	59	740–746
5	76–82	32	578–584	60	746–752
6	82–88	33	584–590	61	752–758
7	174–180	34	590–596	62	758–764
8	180–186	35	596–602	63	764–770
9	186–192	36	602–608	64	770–776
10	192–198	37	608–614	65	776–782
11	198–204	38	614–620	66	782–788
12	204–210	39	620–626	67	788–794
13	210–216	40	626–632	68	794–800
14	470–476	41	632–638	69	800–806
15	476–482	42	638–644	70*	806–812
16	482–488	43	644–650	71*	812–818
17	488–494	44	650–656	72*	818–824
18	494–500	45	656–662	73*	824–830
19	500–506	46	662–668	74*	830–836
20	506–512	47	668–674	75*	836–842
21	512–518	48	674–680	76*	842–848
22	518–524	49	680–686	77*	848–854
23	524–530	50	686–692	78*	854–860
24	530–536	51	692–698	79*	860–866
25	536–542	52	698–704	80*	866–872
26	542–548	53	704–710	81*	872–878
27	548–554	54	710–716	82*	878–884
28	554–560	55	716–722	83*	884–890
		56	722–728		

*The frequencies between 806 and 890 MHz, formerly allocated to television broadcasting, are now allocated to the land mobile services. Operation, on a secondary basis, of some television translators may continue on these frequencies.

of the television channel. There are a total of 12 VHF and 56 UHF television channels, beginning with channel 2 and ending with channel 69. Former UHF channels 70 through 83 are now either used by repeaters or are directly assigned to the land mobile service. Frequency ranges begin at 54 MHz and extend to 806 MHz.

television engineering—See radio engineering.

television interference—Abbreviated TVI. Interference in the reception of the sound and/or video portion of a television program by a transmitter or another device.

television monitor—A television receiver that receives the signals generated by a television camera directly, or remotely through a radio link. It may be used to check image and sound reception continuously, as a closed-circuit television system for security and surveillance, or in editing.

television pickup station—A land mobile station used for the transmission of television program material and related communications from the scenes of events occurring at points removed from television broadcast station studios to the television broadcast stations.

television picture monitor—A special-purpose television set for displaying picture signals in broadcast or closed-circuit television systems. Applications are in studio master control, for tape monitoring, for control of picture quality in studios and intercity network relays, and for the display of pictures for audiences.

television radar air navigation—A system in which aircraft positions are determined by ground radar, and the resulting PPI display, superimposed on a map, is transmitted to the aircraft by television. By this means, each pilot can observe the position of his aircraft in relation to others.

television receive only—Abbreviated TVRO. Small satellite earth stations designed to receive satellite-relayed television programming, but having no provision for transmitting to the satellite. Typically small home systems.

television receiver—A radio receiver for converting incoming electric signals into television pictures and the associated sound.

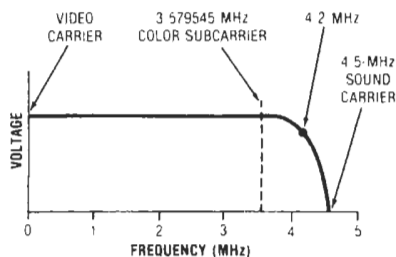
television reconnaissance—Air reconnaissance by optical or electronic means to supplement photographic and visual reconnaissance.

television relay system—A system of two or more stations for transmitting television relay signals from point to point, using radio waves in free space as a medium. Such transmission is not intended for direct reception by the public.

television repeater—A repeater used in a television circuit.

television screen—In a television receiver, the fluorescent screen of the picture tube.

television signal—The audio signal and video signal that are broadcast simultaneously to produce the sound and picture portions of a televised scene.



Television signal.

television transmitter—The aggregate radio-frequency and modulating equipment necessary to supply to an antenna system the modulated radio-frequency power by which all component parts of a complete television signal (including audio, video, and synchronizing signals) are concurrently transmitted.

televoltmeter—A telemeter that measures voltage.

telewattmeter—A telemeter that measures power.

telewriter—See telautograph.

telex—1. An audio-frequency teleprinter system used in Great Britain to provide teletypewriter service over telephone lines. 2. An automatic teleprinter exchange service available worldwide through various common carriers. Western Union is the carrier in the United States. It is similar to TWX. Only Baudot equipment is provided, but business machines may be used also. 3. A dial-up telegraph service enabling its subscribers to communicate directly and temporarily among themselves by means of start-stop apparatus and circuits of the public telegraph network. The service operates worldwide. Computers can be connected to the telex network.

telluric current—See earth current, 1.

telpak—A communications-carrier service for the leasing of wideband channels between points.

Telstar—A low-altitude active communications satellite used for microwave communication and satellite tracking.

tempco—Abbreviation for temperature coefficient.

temperature coefficient—Abbreviated TC or tempco. 1. A factor used to calculate the change in the characteristics of a substance, device, or circuit element with changes in its temperature. 2. The percentage change in the output voltage (or current) of a regulated power supply due to a variation of ambient temperature. The values are usually expressed as a percentage per degree Celsius and restricted to the specified ambient range of the unit. 3. A measure of a sensor's sensitivity, specifically the rate at which a parameter (such as resistance or voltage) changes with temperature. It is usually expressed as a percent per degree (either Fahrenheit or Celsius), and may be positive or negative.

temperature coefficient of capacitance—Often referred to as the TC characteristic. The amount of capacitance change of a capacitor per degree change in temperature. For capacitors that exhibit a relatively linear capacitance change with temperature, the temperature coefficient is commonly expressed in parts per million per degree Celsius (ppm/°C). Capacitors with a nonlinear capacitance change are more often described in terms of percent capacitance change for a given temperature.

temperature coefficient of frequency—The rate at which the frequency changes with temperature, generally expressed in hertz per megahertz per degree Celsius at a given temperature.

temperature coefficient of permeability—A coefficient expressing the change in permeability as the temperature rises or falls. It is expressed as the rate of change in permeability per degree.

temperature coefficient of resistance—Abbreviated TCR. 1. The ratio of the change in resistance (or resistivity) to the original value for a unit change in temperature. The temperature coefficient over the temperature range from t to t_1 , referred to the resistance R_t at temperature t , is determined by the following ratio:

$$\frac{R_{t_1} - R_t}{R_t(t_1 - t)}$$

where t is the temperature, preferably in degrees Celsius. The value will be positive unless otherwise indicated by a negative sign. 2. The maximum change in resistance per

unit change in temperature, usually referred to in parts per million (ppm) per degree Celsius and specified over a temperature range. The temperature is that of the resistor itself, not ambient temperature.

temperature coefficient of voltage drop—The change in the voltage drop of a glow-discharge tube, divided by the change in ambient temperature or in the temperature of the envelope.

temperature coefficient value—The expected percentage change per degree of temperature difference from a specified temperature.

temperature-compensated zener diode—A positive-temperature-coefficient reversed-bias zener diode (pn junction) connected in series with one or more negative-temperature forward-biased diodes within a single package.

temperature-compensating capacitor—Abbreviated TC capacitor. A capacitor whose capacitance varies with temperature in a known and predictable manner. Normally this characteristic is specified with a P or N (positive or negative; to indicate the direction of change) followed by a number that indicates the change in parts per million per degree Celsius (centigrade). Such capacitors are used extensively in oscillator circuits to compensate for changes due to temperature variations in the values of other components.

temperature compensation—The process whereby the effects of an increase or decrease in ambient temperature are canceled (e.g., as in the case of an oscillator that is required to maintain a stable output frequency regardless of ambient temperature changes).

temperature control—1. A switch actuated by a thermostat responsive to changes in temperature; used to maintain temperature within certain limits. 2. A control device responsive to temperature.

temperature cycling—A type of accelerated test in which systems or devices are subjected alternately to high and low temperatures to simulate diurnal temperature fluctuations.

temperature derated voltage—The maximum voltage that may be applied continuously to the terminals of a capacitor at a stated temperature between the rated and the maximum temperature.

temperature derating—Lowering the voltage, current, or power rating of a device or component when it is used at elevated temperatures.

temperature detector—An instrument used to measure the temperature of a body. Any physical property that is dependent on temperature may be employed, such as the differential expansion of two bodies, thermoelectromotive force at the junction of two metals, change of resistance of a metal, or the radiation from a hot body.

temperature-limited—The condition of a cathode when all the electrons emitted from it are drawn away by a strong positive field. The only way to increase the flow of electrons is to raise the cathode temperature.

temperature relay—A relay that functions at a predetermined temperature.

temperature rise—Also called T rise. 1. The difference between the initial and final temperature of a component or device. Temperature rise is expressed in degrees Celsius or Fahrenheit, usually referred to an ambient temperature, and equals the hot-spot temperature minus the ambient temperature. 2. Temperature change of a terminal from a no-load condition to a full-current load.

temperature saturation—See filament saturation.

temperature sensor—See thermistor; thermocouple, 3.

temperature shock—A rapid change from one temperature extreme to another.

temperature-wattage characteristic—In a thermistor, the relationship, for a specific ambient temperature, between the temperature of the thermistor and the applied steady-state power.

temporary magnet—A magnetized material having a high permeability and low retentivity.

temporary memory—A read and write memory containing information that can be changed by the internal circuitry of the electronic switching system.

temporary storage—1. Internal storage locations in a computer reserved for intermediate and partial results. 2. Memory locations or registers reserved for immediate and partial results obtained during the execution of a program.

TEM wave—Abbreviation for transverse electromagnetic wave.

tens complement—1. An arithmetic process employed in a computer to perform decimal subtractions through the use of addition techniques. The tens-complement negative of a number is obtained by individually subtracting each digit in the number from 9 and adding 1 to the result. 2. The radix complement in decimal notation.

tensitized tape—A variety of polyester backing that has been "prestretched" to prevent further severe elongation when subjected to excessive tension. A tape that does not stretch before breaking can be spliced back together without loss of program material.

tensiometer—A device for determining the tautness of a supporting wire or cable.

tension—1. Mechanical—the condition of strain that tends to stretch. 2. Electrical—the potential or electrostatic voltage.

tension arm—An arm, or feeler, over which a recording tape rides as it enters or leaves the heads. It is lightly spring loaded to take up any tape slack and maintain a uniform tension in order to reduce flutter. Should the tape end or break, the arm causes the transport to shut off.

tenth-power width—In a plane containing the direction of the maximum of a lobe, the full angle between the two directions in that plane, about the maximum, in which the radiation intensity is one-tenth the maximum value of the lobe.

tera-—Abbreviated T. Prefix for the numerical quantity of 10^{12} .

terabyte—A unit of memory equal to approximately 1 trillion bytes.

terahertz—One million megahertz, or 10^{12} hertz. Letter symbol: THz.

teraohm—One million megohms, or 10^{12} ohms.

teraohmmeter—An instrument used to measure extremely high resistance.

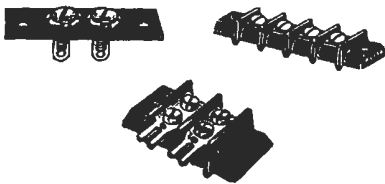
terminal—1. A point of connection for two or more conductors in an electrical circuit. 2. A device attached to a conductor to facilitate connection with another conductor. 3. A point in a system or communication network at which data can be either inserted or removed. 4. A device that permits access to a central computer, usually including a typewriterlike keyboard and either CRT or typing device (teletypewriter) on which the operator's input and the computer's output can be displayed. 5. Any device capable of sending and/or receiving information over a communications channel. 6. The means by which data is entered into a computer system and by which the decisions of the system are communicated to the environment it affects. A wide variety of terminal devices have been built, including teleprinters, special keyboards, light displays, cathode-ray tubes, thermocouples, pressure gauges and other instrumentation, radar units, and telephones. 7.

A device designed to terminate a conductor that is to be affixed to a post, stud, chassis or another conductor, or the like, to establish an electrical connection. Types of terminals include ring, tongue, spade, flag, hook, blade, quickconnect, offset, and flanged.

terminal area—1. A portion of a microelectronic circuit used for making electrical connections to the conductor pattern—e.g., an enlarged pad (area) on a semiconductor die. 2. A portion of a printed circuit used for making electrical connections to the conductive pattern, such as the enlarged portion of conductor material surrounding a component mounting hole.

terminal block—An insulating base or slab equipped with one or more terminal connectors for the purpose of making electrical connections thereto.

terminal board—Also called a terminal strip. 1. An insulating base or slab equipped with terminals for connecting wiring. 2. Board fabricated from an insulating material containing a single or multiple row or arrangement of termination points for the purpose of making connections. 3. An insulated mounting for terminal connections. Terminal strips are available with threaded holes to accept threaded screws or with threaded studs to accept fastening washers and nuts. If terminal areas are separated by an insulating barrier, the terminal strips are called barrier blocks.



Terminal boards.

terminal box—A housing in which cable pairs are brought out to terminations for connections.

terminal brush—A brush with long bristles for cleaning fuses and terminals in a terminal box.

terminal connector—A connector that joins a conductor to a lead, terminal pad (solid or laminated block), or round terminal stud of electrical apparatus.

terminal cutout pairs—Numbered, designated pairs brought out of a cable at a terminal.

terminal emulation—1. A situation in which special software makes a computer behave as though it were a terminal connected to another computer. 2. The process by which an asynchronous terminal, such as a PC, can communicate with a synchronous computer system, such as a mainframe or minicomputer. This is done by imitating (emulating) the operations of the mainframe's or mini's synchronous terminals.

terminal equipment—1. At the end of a communications channel, the equipment essential for controlling the transmission and/or reception of messages. 2. Telephone and teletypewriter switchboards and other centrally located equipment to which wire circuits are terminated. 3. Assemblage of communications-type equipment required to transmit and/or receive a signal on a channel or circuit, whether it be delivery or relay. 4. In radio relay systems, usually refers to equipment used at points where intelligence is inserted or derived, as distinct from equipment used to relay a reconstituted signal. 5. Any equipment at the end of communications lines that sends and/or receives certain signals for specific services.

For example, telephones and teletypewriters are terminal devices; so are many datasets.

terminal guidance—1. Guidance applied to a guided missile between midcourse guidance and arrival at the target. 2. Electronic, mechanical, visual, or other assistance given an aircraft pilot to facilitate arrival at, landing upon, or departure from an air landing or air-drop facility.

terminal hole—Also called component hole. A hole used for the attachment and electrical connection of component terminations, including pins and wires, to a printed board.

terminal impedance—1. The complex impedance seen at the unloaded output or input terminals of transmission equipment or a line in otherwise normal operating condition. 2. *See* terminal resistance.

terminal leg—*See* terminal stub.

terminal lug—1. A threaded lug to which a wire may be fastened in a terminal box. 2. A cylindrical piece of metal, either solid or hollow and of two or more diameters, that can be stacked, flared, swaged, or pressed into a hole for the purpose of connecting leads or external wires to the conductive pattern.

terminal mode—Condition of a PC when it is connected to a host computer.

terminal pad—An alternate term for terminal area.

terminal pair—An associated pair of accessible terminals (e.g., the input or output terminals of a device or network.)

terminal repeater—1. An assemblage of equipment designed specifically for use at the end of a communication circuit—as contrasted with the repeater, which is designed for an intermediate point. 2. Two microwave terminals arranged to provide for the interconnection of separate systems, or separate sections of a system.

terminal resistance—Also called terminal impedance. The total resistance measured between the input terminals of a meter. For an ac meter, it is the effective dc resistance measured by the voltage-doubling or substitution technique with rated end-scale input of the appropriate frequency applied.

terminal resistor—A resistor used as a terminating device.

terminal room—In telephone practice, a room associated with a central office, private branch exchange, or private exchange that contains distributing frames, relays, and similar apparatus.

terminal station—The microwave equipment and associated multiplex equipment employed at the ends of a microwave system.

terminal strip—*See* terminal board.

terminal stub—Also called terminal leg. A piece of cable that comes with a cable terminal for splicing into the main cable.

terminal unit—Abbreviated TU. 1. An apparatus that terminates the considered interface system and by means of which a connection (and translation, if required) is made between the considered interface system and another external interface system. 2. The RTTY equivalent of a modem. It contains a modulator, demodulator, and loop power supply. 3. Equipment usable on a communication channel for either input or output.

terminal VHF omnirange—Very high frequency omnirange, normally low powered, complete with a local monitoring device that will automatically shut down the facility if it is not operating properly.

terminated line—A transmission line terminated in a resistance equal to the characteristic impedance of the line, so that there is no reflection or standing waves.

terminating—The closing of the circuit at either end of a line or transducer by connection to some device.

Terminating does not imply any special condition, such as the elimination of reflection.

terminating capacitor—A capacitor sometimes used as a terminating device for a capacitance sensor antenna. The capacitor allows the supervision of the sensor antenna, especially if a long wire is used as the sensor.

terminating device—A device that is used to terminate an electrically supervised circuit. It makes the electrical circuit continuous and provides a fixed impedance reference (end of line resistor) against which changes are measured to detect an alarm condition. The impedance changes may be caused by a sensor, tampering, or circuit trouble.

termination—1. A load connected to a transmission line or other device. To avoid wave reflections, it must match the characteristic impedance of the line or device. 2. A waveguide technique; the point at which energy flowing along a waveguide continues in a nonwaveguide mode of propagation. 3. The terminals at an antenna to which the transmission line is connected (screw terminals, solder connections, coaxial connector, etc.).

termination block—A nonconductive material on which are provided several termination points.

ternary—1. A numerical system of notation using the base 3 and employing the characters 0, 1, and 2. 2. Able to assume three distinct states.

ternary code—A code in which each element may be any one of three distinct kinds or values.

ternary gates—Ternary circuits that operate on three logic states at a time—that is, in base 3 arithmetic instead of base 2.

ternary incremental representation—A type of incremental representation in which the value of an increment is rounded to one of three values plus or minus one quantum or zero.

ternary pulse-code modulation—A form of pulse-code modulation in which each element of information is represented by one of three distinct values, e.g., positive pulses, negative pulses, and spaces.

terrain-avoidance radar—Airborne radar that provides a display of terrain ahead of a low-flying airplane to permit horizontal avoidance of obstacles.

terrain-clearance indicator—A device for measuring the distance from an aircraft to the surface of the sea or earth.

terrain error—In navigation, the error resulting from distortion of the radiated field by the nonhomogeneous characteristics of the terrain over which the radiation in question has been propagated.

terrain-following radar—Airborne radar that provides a display of terrain ahead of a low-flying aircraft to permit manual control, or signals for automatic control, to maintain constant altitude above the ground.

terrestrial interference—Abbreviated TI. Interference of earth-based microwave communications with reception of satellite broadcasts.

terrestrial-reference flight—Stabilized flight in which control information is obtained from terrestrial phenomena (e.g., flight in which basic information derived from the magnetic field of the earth, atmospheric pressure, and the like is fed into a conventional automatic pilot).

tertiary coil—A third coil used in the output transformer of an audio amplifier to supply a feedback voltage.

tertiary winding—1. A winding added to a transformer, in addition to the conventional primary and secondary windings, to suppress third harmonics or to make connections to a power-factor-correcting device. 2. See stabilized winding.

tesla—The SI unit of magnetic flux density, equal to 1 weber per square meter. Letter symbol: T.

Tesla coil—An air-core transformer used for developing high-voltage discharge at a very high frequency. It has a few turns of heavy wire as the primary and many turns of fine wire as the secondary.

test—A procedure or sequence of operations for determining the manner in which equipment is functioning or the existence, type, and location of any trouble.

test bed—A test site that either contains or simulates all hardware and software interfaces.

test bench—Equipment designed specifically for making overall bench tests on equipment in a particular test setup under controlled conditions.

test board—A switchboard equipped with testing apparatus arranged so that connections can be made from it to telephone lines or central office equipment for testing purposes.

test clip—A spring clip fastened to the end of an insulated wire to enable quick temporary connections when circuits or devices are being tested.

test driver—Tool providing the facilities needed to execute a program, e.g., inputs or files, and commands. May also evaluate outputs and produce reports.

testing level—The value of power used for reference, represented by 0.001 watt working into 600 ohms.

test jack—1. A jack that makes a circuit or circuit element available for testing purposes. 2. In recent practice, a jack that is multiplied with the operating jack on the switchboard.

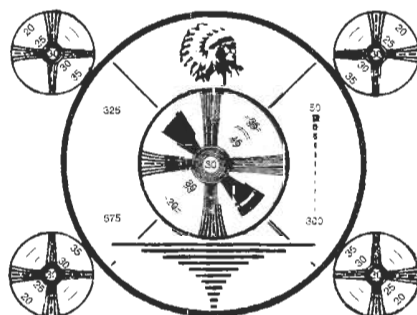
test language—A procedure or programming language designed or adapted for the development of test specifications and routines.

test lead—1. A flexible, insulated lead wire that usually has a test prod on one end. It is ordinarily used for making temporary electrical connections. The insulation normally is rubber; the standard colors are red and black. 2. A flexible insulated lead used chiefly for connecting meters and test instruments to a circuit under test.

test loop—A cycle of tests that can be repeated over and over, e.g., to locate intermittent faults.

test oscillator—A test instrument that can be set to generate an unmodulated or tone-modulated radio-frequency signal at any frequency needed for aligning or servicing receivers and/or amplifiers.

test pattern—A geometric pattern containing a group of lines and circles, used for testing the performance of a television receiver or transmitter by revealing the following video-signal characteristics: horizontal linearity, vertical linearity, contrast, aspect ratio, interlace, streaking, ringing, vertical resolution, and horizontal resolution. The camera is focused on the chart, and the pattern is viewed for fidelity at the monitor.



Test pattern.

test point — 1. A connection to which no instrument is permanently connected, but which is intended for temporary, intermittent, or future connection of an instrument. 2. A convenient, safe access to a circuit or system.

test prod — A sharp metal point used for making a touch connection to a circuit terminal. It has an insulated handle and a means for electrically connecting the point to a test lead.

test program — 1. A software component that implements a test procedure. 2. A particular group of test sequences or test patterns.

test record — A phonograph disc designed to test the quality and characteristics of turntables, pickups, amplifiers, etc.

test routine — In a computer: 1. A synonym for check routine. 2. Generally both the check and the diagnostic routines.

test sequence — A group of test steps or test patterns.

test set — 1. One or more instruments required for servicing of a particular type of equipment. 2. Also called analyzer, circuit verifier, and tester. An assembly of instruments that electrically simulate and monitor electronic equipment. Some test sets are used to service equipment.

test to failure — The practice of inducing increased electrical and mechanical stresses in order to determine the maximum capability of a device so that conservative use in subsequent applications will thereby increase its life through the derating determined by these tests.

test tone — A tone used in circuit identification for purposes of locating trouble or making adjustments.

tetrad — A group of four, especially a group of four pulses used to express a digit in the scale of 10 or 16.

tetrode — A four-electrode electron tube containing an anode, a cathode, a control electrode (grid), and one additional electrode that is ordinarily a screen grid.

tetrode junction transistor — *See* double-base junction transistor.

tetrode transistor — A junction transistor with two electrode connections to the base to reduce interelement capacitance (in addition to the normal emitter and collector elements, each having one connection).

Te value — The temperature at which the resistance of a centimeter cube is 1 megohm.

TE wave — Abbreviation for transverse electric wave.

text — 1. In U.S. ASCII and communications, a sequence of characters treated as an entity if it is preceded by one STX communication control character and terminated by one EXT communication control character. 2. The control sections of an object or load module, considered together. 3. The part of a message or transaction between the control information of the header and that of the trace section or tail that constitutes the information to be processed or delivered to the addressed location. 4. The main part of the message that is sent from a data source (host) to a data link (terminal). It is usually preceded by a header and followed by an "End of Text" signal.

text editing — A general term that encompasses any rearrangement or change performed on textual material, such as deleting, adding, or reformatting.

text fonts — A complete set of one-character type.

T flip-flop — 1. Also called binary. A type of flip-flop whose outputs change state each time the input-signal voltage falls from 1 to 0 and remain unchanged when the input-signal voltage rises from 0 to 1. Thus, there is one change in output state for every two changes in input signal, and the frequency of the output is half the frequency of the input. 2. A flip-flop with only one input. When a pulse appears on the input, the flip-flop changes

states. (Used in ripple counters.) 3. Also called toggle or trigger flip-flop. A circuit that performs the divide-by-two function; frequently used in counting applications.

thallofide cell — A photoconducting cell that has thallium oxysulfide as the light-sensitive agent.

THD — Abbreviation for total harmonic distortion.

theoretical acceleration at stall — A figure of merit derived from the stall-torque to rotor-inertia ratio, which indicates how rapidly a motor will accelerate from stall.

theoretical cutoff — *See* theoretical cutoff frequency.

theoretical cutoff frequency — Also called theoretical cutoff. The frequency at which, disregarding the effects of dissipation, the attenuation constant of an electric structure changes from zero to a positive value or vice versa.

theoretical electrical travel — The shaft travel over which the theoretical function characteristic of a precision potentiometer extends, as determined from the index point.

theremin — An electronic musical instrument consisting of two radio-frequency oscillators that beat against each other to produce an audio-frequency tone, in a manner similar to a beat-frequency audio oscillator. The pitch and volume are varied by hand capacitance.

thermal — A general term for all forms of thermoelectric thermometers, including a series of couples, thermopiles, and single thermocouples.

thermal agitation — 1. Movement of the free electrons in a material. In a conductor they produce minute pulses of current. When these pulses occur at the input of a high-gain amplifier in the conductors of a resonant circuit, the fluctuations are amplified together with the signal currents and heard as noise. 2. Also called thermal effect. Minute voltages arising from random electron motion, which is a function of absolute temperature expressed in kelvins. 3. In a semiconductor, the random movement of holes and electrons within a crystal due to the thermal (heat) energy.

thermal-agitation voltage — The potential difference produced in circuits by thermal agitation of the electrons in the conductor.

thermal alloying — The act of uniting two different metals to make one common metal by the use of heat.

thermal ammeter — *See* hot-wire ammeter.

thermal breakdown — 1. A form of breakdown in which decomposition or melting occurs due to the temperature rise resulting from the applied electric stress. 2. A runaway condition in a dielectric, the loss factor of which increases with temperature. Dielectric loss heats the material, producing an increase in temperature. Therefore, the dielectric loss increases still more, producing a further increase in temperature, and so on.

thermal circuit breaker — A circuit breaker whose operation depends on temperature expansion due to electrical heating.

thermal coefficient of resistance — The change in the resistivity of a substance due to the effects of temperature only. Usually expressed in ohms per ohm per degree change in temperature.

thermal compensation — A method employed to reduce or eliminate the thermal effects on one or more of the performance parameters of a transducer.

thermal compression bonding — Diffusion bonding whereby two carefully prepared surfaces are brought into intimate contact under carefully controlled conditions of temperature, time, and clamping pressure. Plastic deformation is induced by the combined effects of pressure and temperature, which in turn results in atom movement causing the development of a crystal lattice bridging the

gap between the facing surfaces and results in bonding. (Time is a critical factor in controlling the ambient temperature at the area to be bonded and the size of the bond that is formed.) Generally, the process is performed under a protective atmosphere of inert gas to keep the surfaces to be bonded clean while they are being heated.

thermal conduction—1. The transfer of thermal energy by processes having no net movement of mass and having rates proportional to the temperature gradient. 2. The rate of flow of heat through a material by thermal conduction.

thermal conductivity—A measure of the ability of a substance to conduct heat. Expressed in terms of calories of heat conducted per second per square centimeter per centimeter of thickness per degree Celsius difference in temperature from one surface to the other.

thermal conductor—A material that readily transmits heat by conduction.

thermal contraction—The shrinkage exhibited by most metals when cooled.

thermal converter—Also called thermocouple converter, thermoelectric converter, thermoelectric generator, or thermoelement. One or more thermojunctions in thermal contact with, or an integral part of, an electric heater, so that the electromotive force developed by thermoelectric action at the output terminals gives a measure of the input current in the heater.

thermal cutoff—1. An overcurrent protective device that contains a heater element that affects a fusible member and thereby opens the circuit. 2. A heat-sensitive switch that automatically opens the circuit of an electrical device when the operating temperature of the device exceeds a predetermined value.

thermal derating factor—The factor by which the power dissipation rating must be reduced with an increase of ambient or case temperature.

thermal detector—See bolometer.

thermal drift—A change in the output of a regulated power supply over a period of time, due to changes in internal ambient temperatures not normally related to environmental changes. Thermal drift is usually associated with changes in line voltage and/or load changes.

thermal effect—See thermal agitation, 2.

thermal emf—The electromotive force generated when the junction of two dissimilar metals is heated. See also Seebeck emf.

thermal endurance—An indication of the relative life expectancy of a product when exposed to operating temperatures much higher than normal room temperature.

thermal equilibrium—The condition that exists when a system and its surroundings are at the same temperature.

thermal expansion—1. Physical expansion resulting from an increase in temperature; it may be linear and volumetric. 2. The expansion of a material when subjected to heat.

thermal flasher—An electric device that automatically opens and closes a circuit at regular intervals, owing to alternate heating and cooling of a bimetallic strip heated by a resistance element in series with the circuit being controlled.

thermal generation—The creation of a hole and a free electron by freeing a bound electron through the addition of heat energy.

thermal instrument—An instrument that depends on the heating effect of an electric current for its operation (e.g., thermocouple and hot-wire instruments).

thermal ionization—Ionization due to high temperature (e.g., in the electrically conducting gases of a flame).

thermal junction—See thermocouple.

thermal lag—The time expended in raising the entire mass of a cathode structure to the temperature of the heater.

thermal life—The operating life of a device under varying ambient temperatures.

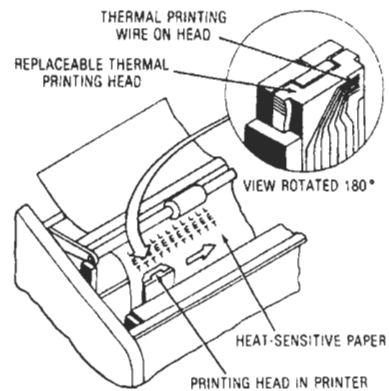
thermal microphone—A microphone depending for its action on the variation in the resistance of an electrically heated conductor that is being alternately increased and decreased in temperature by sound waves.

thermal noise—Also called resistance, Johnson, and white noise. 1. Random circuit noise associated with the thermodynamic interchange of energy necessary to maintain thermal equilibrium between the circuit and its surroundings. See also Johnson noise. 2. Noise generated by the random thermal motion of charged particles. 3. A voltage, produced by the random motion of free electrons in a conductor, whose value is instantaneously fortuitous with time and whose spectral components uniformly embrace the electromagnetic gamut—albeit the bandwidth of many practical circuits limit both the noise spectrum and magnitude as well. Thermal noise is characterized by a normal distribution of levels. 4. A type of electromagnetic noise produced in conductors or in electronic circuitry that is proportional to temperature. 5. Noise that occurs in all transmission media and communications equipment as a result of random electron motion (which is a function of temperature). Thermal noise sets the lower limit for the sensitivity of a receiving system.

thermal noise level—The equivalent rms voltage value, over a stated bandwidth, of all energy components generated by a resistor at a stated resistor temperature with no externally supplied current through the resistor.

thermal oxidation—The formation of a self-oxide on the exposed surfaces of a semiconductor.

thermal printer—1. A nonimpact printing device that utilizes a special heat-sensitive paper. The paper passes over a matrix of dot heating elements. As data is fed to the printer, dot elements relating to specific characters are heated, which changes the color of the paper at that point to reveal individual characters. 2. A printer that forms characters in a dot matrix by selectively heating printhead elements as they move across the paper.



Thermal (matrix) printer.

thermal protector—A current- and temperature-responsive device used to protect another device against overheating due to overload.

thermal radiation—Commonly known as heat. 1. Radiation produced by the action of heat on molecules

or atoms. Its frequency extends between the extremes of infrared and ultraviolet. 2. The process of electromagnetic emission in which the radiated energy is extracted from the thermal excitation of atoms or molecules.

thermal rating—1. A statement of the permissible temperature rating, beyond which unsatisfactory performance occurs. 2. The maximum or minimum temperature at which a material or component will perform its function without undue degradation.

thermal regenerative cell—A fuel-cell system in which there is continuous regeneration of the reactants from the products formed during the cell reaction.

thermal relay—A relay that responds to the heating effect of an energizing current, rather than to the electromagnetic effect. Delay between the start of the energizing current and the switching response is generally predictable and sometimes adjustable.

thermal resistance—1. Ratio of the temperature rise to the rate at which heat is generated within a device under steady-state conditions. 2. The resistance of a substance to the conductivity of heat. 3. That change in the electrical resistance of a material when subjected to heat. 4. Of a semiconductor device, the quotient of the temperature difference between two specified points or regions and the heat flow between these two points or regions under conditions of thermal equilibrium.

thermal resistivity—Thermal resistance of a unit cube of material.

thermal resistor—An electronic device that makes use of the change in resistivity of a semiconductor with changes in temperature. *See* thermistor.

thermal response time—The time from the occurrence of a step change in power dissipation until the junction temperature reaches 90 percent of the final value of junction-temperature change, when the device-case or ambient temperature is held constant.

thermal runaway—1. A regenerative condition in a transistor, whereby heating at the collector junction causes collector current to increase, which in turn causes more heating, etc. The temperature can rapidly approach levels that are destructive to the transistor. 2. An unstable condition common in bipolar transistors occurring because collector current and gain both increase with device temperature. Permanent damage can result if circuit precautions are not taken.

thermal sensitivity set—A permanent change in sensitivity due to temperature effects only. Usually expressed as the difference in sensitivity at room temperature before and after a temperature cycle over the operating temperature range of the transducer.

thermal shock—1. A sudden, marked change in the temperature of the medium in which a component or device operates. 2. The effect of heat or cold applied at such a rate that nonuniform thermal expansion or contraction occurs within a given material or combination of materials. In connectors, the effect can cause inserts and other insulation materials to pull away from metal parts.

thermal telephone receiver—Also called thermophone. An electroacoustic transducer, such as a telephone receiver, in which the temperature of a conductor is caused to vary in response to the current input, thereby producing sound waves as a result of the expansion and contraction of the adjacent air.

thermal time constant—1. The time from the occurrence of a step change in power dissipation until the junction temperature reaches 63.2 percent of the final value of junction-temperature change, when the device-case or ambient temperature remains constant. 2. In a thermistor, the time required for 63.2 percent of the change from initial to final body temperature after the application of a step change in temperature under zero-power conditions.

thermal time-delay relay—A type of relay in which the time interval between energization and actuation is determined by the thermal storage capacity of the actuator critical operating temperature, power input, and thermal insulation.

thermal time-delay switch—1. An overcurrent protective device containing a heater element and thermal delay. 2. A switch whose contacts control a load circuit and are delayed from operating for a predetermined time interval. Operation of the contacts is by the effect of heat generated by current through a heater.

thermal tuning—Adjusting the frequency of a cavity resonator by using thermal expansion to vary its shape.

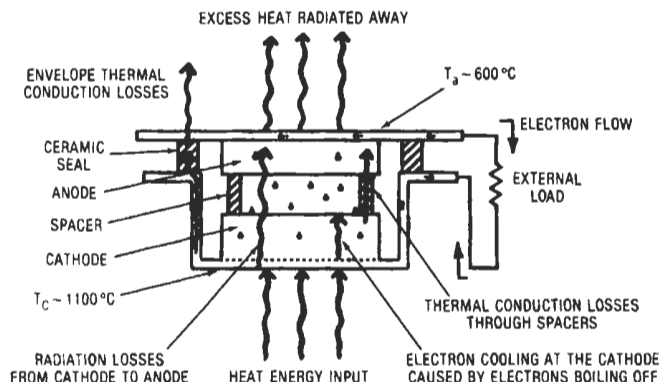
thermic—Pertaining to heat.

thermion—An ion, either positive or negative, that has been emitted from a heated body. Negative thermions are electrons (thermoelectrons).

thermionic—1. Pertaining to the emission of electrons by heat. 2. Pertaining to the emission of electrons or ions from an incandescent body.

thermionic cathode—*See* hot cathode.

thermionic converter—Also called thermionic generator or thermoelectron engine. A device that produces electrical power directly from heat. One type contains a heated cathode to emit electrons and a cold anode to collect them, thereby causing a current. Both electrodes are enclosed in a vacuum or gas-filled envelope.



Thermionic converter.

thermionic current—Current due to directed movements of thermions (e.g., the flow of electrons from the cathode to the plate in a thermionic vacuum tube).

thermionic detector—A detector circuit in which a thermionic vacuum tube delivers an audio-frequency signal when fed with a modulated radio-frequency signal.

thermionic diode—A diode electron tube that has a heated cathode.

thermionic emission—1. Emission of electrons from a solid body as a result of elevated temperature. *See also* Edison effect. 2. That portion of the emission of electrons from a hot cathode in a vacuum tube which is due solely to the elevated temperature of the cathode.

thermionic energy conversion—The direct production of electricity by means of the electron emission from a heated substance.

thermionic generator—*See* thermionic converter.

thermionic grid emission—Also called primary grid emission. The current produced by the electrons thermionically emitted from a grid. Generally it is due to excessive grid temperatures or to contamination of the grid wires by cathode coating material.

thermionic rectifier—A rectifier utilizing a thermionic vacuum tube to convert alternating current into unidirectional current.

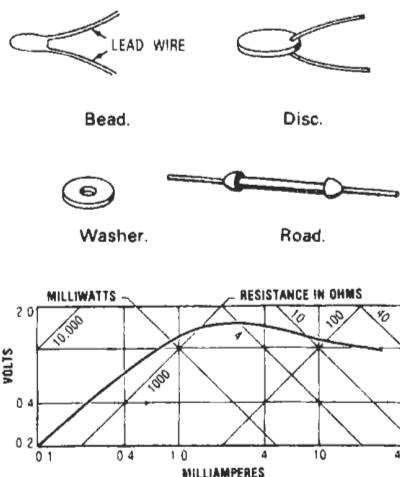
thermionic tube—*See* hot-cathode tube.

thermionic work function—The energy required to transfer electrons from a given metal to a vacuum or some other adjacent medium during thermionic emission.

thermistor—Also called thermal resistor. 1. A thermally sensitive solid-state semiconducting device made by sintering mixtures of the oxide powders of various metals. (Made in many shapes, such as beads, disks, flakes, washers, and rods, to which contact wires are attached.) As its temperature is increased, the electrical resistance (typically) decreases. The associated temperature coefficient of resistance is extremely high, nonlinear, and most frequently negative. The large temperature coefficients and the nonlinear resistance temperature characteristics of thermistors enable them to perform many unique regulatory functions. 2. A passive semiconductor device whose electrical resistance varies with temperature. Its temperature coefficient of resistance is high, nonlinear, and usually negative. 3. A solid-state semiconducting structure (basically one of the bolometers) that changes electrical resistance with temperature. Materially, some kind of ceramic composition is used. It is of much higher electrical resistance than metallic bolometers and, hence, requires much higher voltages to become useful. 4. A resistor with a high temperature coefficient of resistance, exhibiting a definite, reliable, repeatable response to temperature change. Negative temperature coefficient (TC) types show an exponential decrease in resistance as temperature increases. Positive TC types show an increase

thermionic current — thermocompression bonding

in resistance with increasing temperature. 5. A resistor that is sensitive to temperature changes. It will change in ohmic value as a function of changing temperature.



Typical characteristic.

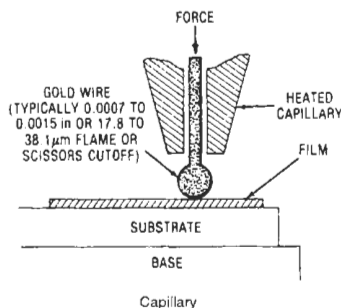
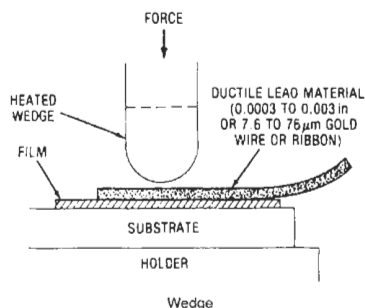
Thermistors.

thermoammeter—Also called a thermocouple ammeter. An ammeter that is actuated by the voltage generated in a thermocouple through which the current to be measured is sent. It is used chiefly for measuring radio-frequency currents.

thermocompensator—In pH meters, a temperature-sensitive device sometimes used to make electronic adjustments in the circuit that are required due to changes in the temperature of the solution.

thermocompression bond—A bond formed by two elements through the simultaneous application of heat and pressure. No additional materials are used to assist the fusing. Common types of thermocompression bonds are wedge, ball (nailhead), and stitch. *See* ball bond; stitch bond.

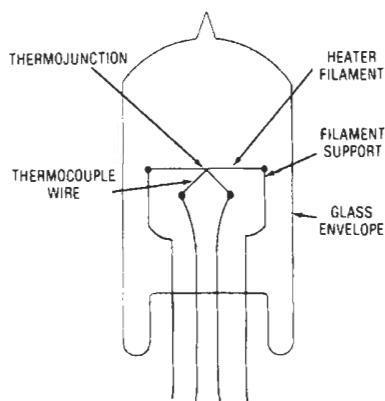
thermocompression bonding—1. A method of interconnecting ICs in a circuit by bonding thin gold wires between conducting patterns of a circuit and to the IC chip's metal preforms by means of heat and pressure. 2. The joining of two materials by the combined effects of heat and pressure.



Thermocompression bonding.

thermocouple—Also called thermal junction.

1. Temperature transducer comprising a closed circuit made of two different metals. If the two junctions are at different temperatures, an electromotive force is developed that is proportional to the temperature difference between the junctions. This is called the Seebeck effect. 2. Dissimilar metals that, when welded together, develop a small voltage dependent on the relative temperature between the hotter and the colder junction. Banks of thermocouples connected together in series of parallel make up a thermopile. Either may be thought of as a weak battery that converts radiant to electrical energy. 3. A device for measuring temperature in which two electrical conductors of dissimilar metals are joined at the point of heat application and a resulting voltage difference, directly proportional to the temperature, is developed across the free ends and is measured potentiometrically. 4. A pair of dissimilar-metal wires, joined so that when their junction is heated, the thermoelectric effect causes a voltage to be generated that is proportional to the temperature.



Thermocouple.

thermocouple ammeter—*See* thermoammeter.

thermocouple contact—A contact of special material used in connectors employed in thermocouple applications. Materials often used are iron, constantan, copper, chromel, alumel, and others.

thermocouple converter—*See* thermal converter.

thermocouple instrument—An electrothermic instrument in which one or more thermojunctions are heated by an electric current, causing a direct current to flow through the coil of a suitable direct-current mechanism such as one of the permanent-magnet, moving-coil type.

thermocouple junction—A pair of electrically dissimilar metals that make intimate contact and generate a voltage related to temperature.

thermocouple lead wire—An insulated pair of wires used from the thermocouple to a junction box or to the recording instrument.

thermocouple thermometer—*See* thermoelectric thermometer.

thermocouple vacuum gage—A vacuum gage that depends for its operation on the thermal conduction of the gas present. The pressure being measured is a function of the electromotive force of a thermocouple whose measuring junction is in thermal contact with a heater carrying a constant current. Thermocouple vacuum

gages ordinarily are used over a pressure range of 10^{-1} to 10^{-3} mm Hg.

thermocouple wire—A wire drawn from special metals or alloys and calibrated to established specifications for use as a thermocouple pair (e.g., iron, constantan, alumel, etc.).

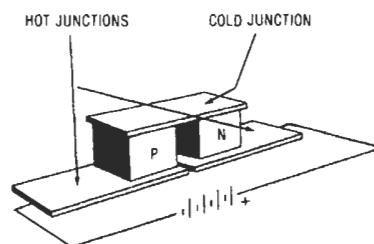
thermodynamics—1. The study of the relationship between heat and other forms of energy. 2. Examination of the processes whereby heat energy is converted into other forms of energy.

thermoelectric arm—Also called thermoelectric leg. The portion of a thermoelectric device having the electric current density and the temperature gradient approximately parallel or antiparallel and having electrical connections made at its extremities to a part in which the opposite relation between the direction of the temperature gradient and the electric current density exists.

thermoelectric converter—A device capable of converting heat energy directly into electrical energy. *See also* thermal converter.

thermoelectric cooler—1. A device utilizing the Peltier phenomenon to provide a silent, nonmoving cooler having a controllable cooling rate. 2. A solid-state device that cools as current passes through it.

thermoelectric couple—A thermoelectric device in which there are two arms of unlike composition.



Thermoelectric couple.

thermoelectric device—A general term for thermoelectric heat pumps and generators.

thermoelectric effect—The electromotive force produced by the difference in temperature between two junctions of dissimilar metals in the same circuit.

thermoelectric engine—*See* thermoelectric converter.

thermoelectric generator—*See* thermal converter.

thermoelectric heating device—A thermoelectric heat pump used for adding thermal energy to a body.

thermoelectric heat pump—A device in which the direct interaction of an electrical current and heat flow is used to transfer thermal energy between bodies.

thermoelectricity—1. The direct conversion of heat into electricity. 2. The reciprocal use of electricity to create heat or cold. *See also* Peltier effect; Seebeck effect; Thomson effect. 3. Electricity produced by the agency of heat alone. *See also* thermocouple.

thermoelectric junction—1. A thermojunction, as in a thermocouple. 2. A junction between dissimilar wires in a thermocouple or thermopile. A potential difference is created at that junction by the application of heat.

thermoelectric leg—*See* thermoelectric arm.

thermoelectric manometer—A manometer (pressure-measuring instrument) that depends on the variation of thermoelectromotive force (voltage due to heat) with pressure.

thermoelectric series—A series of metals arranged in the order of their thermoelectric powers.

thermoelectric solar cell—A solar cell that uses a thermoelectric converter, consisting of two sheets of metal with a semiconductor sandwiched between them, to generate electricity.

thermoelectric thermometer—Also called a thermocouple thermometer. A thermometer employing one or more thermocouples, of which one set of measuring junctions is in thermal contact with the body whose temperature is to be measured, while the temperature of the reference junctions is either known or otherwise taken into account.

thermoelectromotive force—1. The voltage developed due to the differences in temperature between parts of a circuit containing two or more different metals. 2. The algebraic sum of the Peltier emf at a thermocouple junction and the Thomson emf in the thermocouple metals.

thermoelectron—The electron emitted from a heated body.

thermoelectron engine—See thermionic converter.

thermoelement—A device consisting of a thermocouple and a heating element arranged for measuring small currents. See also thermal converter.

thermogalvanometer—An instrument for measuring small high-frequency currents from their heating effect. Generally it consists of a dc galvanometer connected to a thermocouple that is heated by a filament carrying the current to be measured.

thermogram—High-resolution images resulting from a series of thermal scans using a bolometer.

thermograph—Radiation chart that plots heat emitted by the body.

thermography—1. The process of recording the distribution of temperature over the surface of an object by detecting the heat radiation from it. The detection may be by the effect of radiation on an infrared-sensitive phosphor or by the use of cholesteric liquid crystals that exhibit brilliant colors with temperature change. 2. The recording of a scanned pattern on a photographic medium, utilizing the infrared radiation naturally emitted by the object, as well as infrared receptors, such as photoelectric cells. 3. The technique of producing pictures from heat.

thermojunction—One of the contact surfaces between the two conductors of a thermocouple. The thermojunction in thermal contact with the body under measurement is called the measuring junction, and the other thermojunction is called the reference junction.

thermojunction battery—A nuclear-type battery that converts heat into electrical energy directly by the thermoelectric or the Seebeck effect.

thermoluminescence—1. The production of light in a material by moderate heat. 2. An alternative term for incandescence.

thermomagnetic—1. Pertaining to the effect of temperature on the magnetic properties of a substance. 2. Pertaining to the effect of a magnetic field on the temperature distribution in a conductor.

thermometer—An instrument for measuring temperature. Electrical versions depend on the change in resistance of a material with temperature, the voltage produced in a thermocouple, or various other effects of temperature.

thermophone—An electroacoustic transducer in which sound waves of calculable magnitude are produced by the expansion and contraction of the air adjacent to a conductor whose temperature varies in response to a current input. See also thermal telephone receiver.

thermoelectric series — thermostatic switch

thermopile—A group of thermocouples connected in series. Specifically: 1. A device used to measure radiant power or energy. 2. A source of electric energy. 3. Battery of thermocouples, consisting of alternate rods of antimony and bismuth suitably joined and connected to a galvanometer. Thermopiles are used for the measurement of heat where thermometers cannot be employed.

thermoplastic—1. A term describing plastic materials that can be made to flow repeatedly by applying heat. Lowering the temperature causes hardening. See thermosetting. 2. A type of plastic that can be remelted a number of times without any important change in properties. For example, nylon, lexan, and PVC are thermoplastic plastics. Such plastics are resilient after molding. 3. A classification of resin that can be readily softened and resoftened by repeated heating.

thermoplastic flow test—For an insulating material, a measure of the resistance to deformation when subjected to heat and pressure.

thermoplastic material—A plastic material that can be softened by heat and rehardened into a solid state by cooling. This remelting and remolding can be done many times.

thermoplastic polyesters—Family of plastics with excellent dimensional stability, electrical properties, toughness, and chemical resistance.

thermoplastic recording—A recording process in which information is placed onto plastic tape electronically. A special electron gun, fed by a digital or scanner input, writes a charge in narrow bands on a moving film coated with a plastic that has a low melting point. The film is heated by an rf heater that melts the plastic coating, permitting it to be deformed by electrostatic and surface-tension forces in proportion to the charge laid down by the beam of the electron gun. The ridges cool quickly and form a diffraction grating that can then be viewed, projected by suitable optics, or read out by a flying-spot scanner. The system operates in a high vacuum.

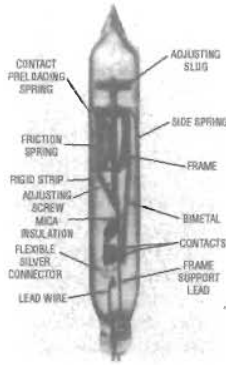
thermosetting—1. A term describing plastic materials that are capable of becoming essentially insoluble or infusible when cured. Once cured, these materials do not soften or flow. See thermoplastic. 2. A term used to describe materials that are processed using steam or radiation. After processing the materials cannot be made to flow under the application of heat. 3. A classification of resin that cures by chemical reaction when heated and, when cured, cannot be resoftened by heating.

thermosetting material—Plastic that hardens when heat and pressure are applied. Unlike a thermoplastic, it cannot be remelted or remolded.

thermosetting plastic—A type of plastic in which an irreversible chemical reaction takes place while it is being molded under heat and pressure. This type of plastic cannot be reheated or softened without adversely affecting its properties. Melamine and diallyl-phthalate are thermosetting plastics.

thermostat—A mechanism that can be set to operate at definite temperatures and can convert the expansion of heated metal or fluid into sufficient movement and power to operate small devices, control electric circuits or small valves, etc.

thermostatic switch—1. A temperature-operated switch that receives its operating energy by thermal conduction or convection from the device being controlled or operated. 2. A switch whose function is controlled by variations of temperature and whose contacts make or break a load circuit automatically when the temperature of the ambient space in which its sensing element is placed or the temperature of the surface on which it is fixed reaches a predetermined value.



Thermostat.

thermostat wire—Single or multiple-conductor wire, bare soft solid-copper conductor, usually PVC insulated. May be twisted and/or jacketed. May have enameled or nylon covered conductors and may have a metal armor covering. May also have asbestos insulations. It is used to transmit electrical signals between the thermostat and the heating or cooling unit.

theta—Brain wave signals whose frequency is approximately 3.5 to 7.5 Hz. The associated mental state is fuzzy, unreal, uncertain, daydreamlike, or ambiguous.

theta polarization—The state of the wave whereby the E vector is tangential to the meridian lines of some given spherical frame of reference.

Thevenin's theorem—The current that will flow through an impedance Z_1 when connected to any two terminals of a linear network between which an open-circuit voltage E and impedance Z previously existed is equal to the voltage E divided by the sum of Z and Z_1 .

thick film—1. Pertaining to a film pattern usually made by applying conductive and insulating materials to a ceramic substrate by a silk-screen process. Thick films can be used to form conductors, resistors, and capacitors. 2. Successive layering of resistive, dielectric, and conductive inks on a substrate by a type of screening process. 3. Technology using pastes to form conductor, resistor, and insulator patterns; usually screened onto the substrate and cured by firing at temperatures of 800°C to 900°C. While less expensive than thin films, thick-film resistors exhibit somewhat poorer matching and temperature coefficients. 4. A layer of resistive, dielectric, or conductive paste that is deposited on a substrate by screen printing, then fired at an elevated temperature to drive off the binder and sinter the solids. By definition, the thickness is greater than 10^4 angstroms (0.0004 inch),

although characteristically it is 0.0004 to 0.001 inch (6.3 to 25 μm).

thick-film assembly—Network deposited on a ceramic substrate, in combination with discrete active elements, forming a complete hybrid functional circuit.

thick-film circuit—1. A microelectronic assembly in which the passive circuit elements and their interconnections are defined on a ceramic substrate by using the silk-screen process. The active elements are added as discrete chips or packaged devices. 2. Conductive, resistive, and/or capacitive network deposited on a substrate using a metallic or resistive film that is more than 5 micrometers in thickness. 3. A completed assembly of a thick-film substrate and possible add-on components, with its appropriate terminations and packaging. 4. A microcircuit whose passive components consist of a ceramic-metal combination deposited on a given substrate by screening and firing processes.

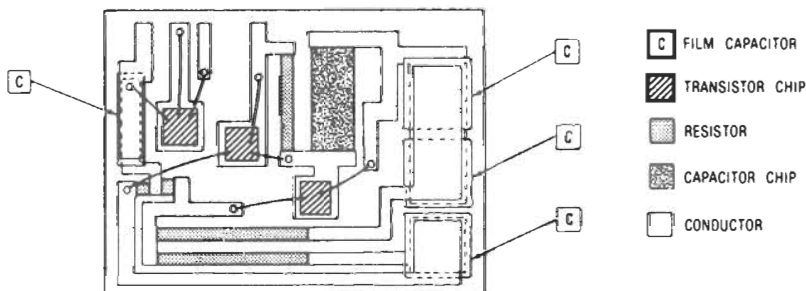
thick-film hybrid integrated circuits—The physical realization of a hybrid integrated circuit fabricated on a thick-film network.

thick-film hybrids—1. A hybrid circuit in which conductive and resistive pastes are deposited on a substrate and heated. Heating hardens the paste and fuses it to the substrate. Once hardened, the resistive pastes become thick-film resistors, named because the thickness is about 1 mil (25 μm). Capacitors, discrete semiconductors, and ICs are then added to the circuit. 2. A thick-film circuit with add-on components other than encapsulated chips.

thick-film network—A thick-film circuit that does not have add-on components.

thick-film process—1. A method in which electronic circuit elements—resistors, conductors, capacitors, etc.—are produced by applying specially formulated pastes to a ceramic substrate in a defined pattern and sequence. The substrate containing the "green pattern" is fired at a relatively high temperature to mature the circuit elements and bond them integrally to the substrate. The term thick film distinguishes this technology from thin-film practice, in which circuit elements are made by evaporation or sputtering in a high-vacuum environment. Circuits produced by this technology are identified by several descriptive phrases: thick-film passive circuits or thick-film hybrid circuits when active devices are included. 2. A method of manufacturing hybrid circuits by screen deposition of conductive, resistive, or insulating films thicker than 0.005 inch (127 μm). Thick-film structures generally contain only conductors, resistors, and capacitors, with any other required components added as discrete devices.

thick-film resistor—A fixed resistor whose resistance element is a film considerably more than 0.001 inch (25 μm) thick.



Thick-film hybrid integrated circuit.

thick-film resistor, conductor, and dielectric compositions—The principal materials for making thick-film circuits, available in paste form and consisting of mixtures of metal, oxide, and glass powders.

thick-film resistor network—A combination of several resistors manufactured by incorporating the use of precious metal inks, screen printed and fired onto alumina substrates.

thick films—Layers of resistive, dielectric, and conductive inks that are deposited on a substrate. The deposition process, similar to graphic silk screening, employs a fine-mesh screen to hold the pattern for the components that are to be deposited. The pattern is produced by photographic means, and wherever the inks are not to be deposited, the holes in the mesh are blocked by an emulsion.

thick-film substrate—A supporting material (commonly alumina) on which circuit elements such as conductors, resistors, inductors, and capacitors have been realized by a printing and firing technique.

thickness vibration—Vibration of a piezoelectric crystal in the direction of its thickness.

thin film—1. A film of conductive or insulating material, usually deposited by sputtering or evaporation, that may be made in a pattern to form electronic components and conductors on a substrate or used as insulation between successive layers of components. 2. The deposition of thin layers of a substance on an insulating base in a vacuum by a microelectronic process. 3. A conductive, resistive, and/or capacitive passive network deposited on a substrate using a metallic or resistive film that is less than 5 micrometers in thickness. 4. Metal film used to fabricate conductors and resistors, usually a few hundred angstroms thick. Commonly used resistor materials are nickel-chromium, tantalum nitride, and silicon-chromium. These films are usually deposited using sputtering, vacuum evaporation, or electron-beam techniques. 5. A method of manufacturing hybrid circuits in which evaporation or sputtering techniques are used to deposit very thin films of material onto a substrate. These film structures generally contain only conductors, resistors, and capacitors, with any other required components added as discrete devices.

thin-film assembly—Passive or active network deposited on a suitable substrate using vapor or vacuum deposition techniques. The components may be produced individually, they may be totally integrated, or they may be combined as hybrids with the advantages of extremely small size and weight plus a low cost for a high-volume production. Thin-film assembly requires considerable engineering effort and sophisticated production equipment.

thin-film capacitor—A capacitor utilizing a metal oxide as the dielectric or insulating material. Both the electrodes and the dielectric are deposited in layers on a substrate. This device is usually associated with microelectronics and integrated and thin-film circuits.

thin-film circuit—1. A microcircuit in which the component element and interconnections are fabricated from thin deposited films of metal, semiconductor, and dielectric material, generally on an insulating substrate such as ceramic or sapphire. The term *thin* is usually taken to imply films having a thickness on the order of 1 micrometer. 2. A circuit whose passive components are deposited on a given substrate by sputtering or vacuum processes.

thin-film deposition (chemical vapor type)—A technique that involves a decomposition and reaction between gases on the surface of a heated substrate such that a solid layer is nucleated and grown. Metals are generally derived from the decomposition of the

metal halides. Insulators may be formed by reacting metal halides with oxygen (oxides), ammonia (nitrides), diborane (borides), etc.

thin-film deposition (evaporation type)—Popular technique for depositing thin film in vacuum, accomplished by heating the source material in a low-pressure chamber so that it vaporizes and then condenses onto all cooler surfaces in line of sight from the source.

thin-film deposition (sputtering type)—Evaporation produced by ion bombardment of the source material, known as cathode sputtering.

thin-film deposition materials (conductors and resistors)—Metals such as aluminum, gold, chromium, nickel, platinum, tungsten, alloys, and cermets deposited as electrical conductors and resistors on silicon or other substrates.

thin-film deposition materials (inorganic dielectrics)—Film compounds produced by various vacuum evaporation processes and deposited on substrates to perform electrical functions. Examples include silicon monoxide, ZnS, CaF, SiO₂, Al₂O₃, Si₃N₄, and other chemical compounds.

thin-film deposition materials (organic dielectrics)—Insulating film compounds produced when organic vapors are heated under conditions in which polymerization and deposition occur. Examples are parylene, butadiene, acrolein, and divinylbenzene.

thin-film deposition materials (semiconductors)—Polycrystalline films deposited by vacuum or flash evaporation to produce high-purity single-crystal silicon or other semiconductor substances.

thin-film formation—A process that is either additive, by pattern formation through masks, or subtractive, by selective etching of predeposited films from a substrate.

thin-film hybrid integrated circuit—The physical realization of a hybrid integrated circuit fabricated on a thin-film network.

thin-film hybrids—Hybrid circuits that are made by placing the substrate in a vacuum chamber and depositing films of conductive and resistive material on the entire substrate. The material is photoetched in selected patterns to form conductive interconnections and thin-film resistors. These resistors are approximately 0.1 mil (25 μ m) thick. Unencapsulated components are then added either by soldering or chemical bonding.

thin-film integrated circuit—1. An integrated circuit consisting of a passive substrate on which the various passive elements (resistors and capacitors) are deposited in the form of thin-patterned films of conductive or non-conductive material. Active components (transistors and diodes) are attached separately as individually packaged devices or in unpackaged (chip) form, or may be formed integrally by thin-film techniques. *See also* hybrid thin-film circuit. 2. A device consisting of a number of electrical elements entirely in the form of thin films deposited in a pattern on a supporting material. 3. The physical realization of a number of electric elements entirely in the form of thin films deposited in a patterned relationship on a structural supporting material.

thin-film memory—In a computer, a storage device made of thin disks of magnetic material deposited on a nonmagnetic base. Its operation is similar to the core memory. *See also* core memory, 1; storage, 2.

thin-film microelectronics—Circuits made up of two-dimensional passive and essentially two-dimensional active elements mounted or deposited on thin wafers of an insulating substrate material.

thin-film optical modulator—A device made of multilayered films of material of different optical characteristics capable of modulating transmitted light

by using electroacoustic, electro-optic, or magneto-optic effects to obtain signal modulation. Thin-film optical modulators are used as component parts of integrated optical circuits.

thin-film optical multiplexer—A multiplexer consisting of layered optical materials that make use of electroacoustic, electro-optic, or magneto-optic effects to accomplish the multiplexing. Thin-film optical multiplexers may be component parts of integrated optical circuits.

thin-film optical switch—A switching device for performing logic operations using light waves in thin films, usually supporting only one propagation mode, making use of electroacoustic, electro-optic, or magneto-optic effects to perform switching functions, such as are performed by semiconductor gates (AND, OR, NOT). Thin-film optical switches may be component parts of integrated optical circuits.

thin-film optical waveguide—An optical waveguide consisting of thin layers of differing refractive indices, the lower indexed material on the outside or as a substrate, for supporting usually a single electromagnetic wave propagation mode with laser sources. The thin-film waveguide lasers, switches, modulators, filters, directional couplers, and related components need to be coupled from their integrated optical circuits to the optical waveguide transmission media, such as optical fibers and slab dielectric waveguides.

thin-film resistor network—A combination of several resistors manufactured by deposition of appropriate alloys and metals onto glass silicon and alumina substrates using vacuum techniques.

thin films—Resistive materials of submicrometer thickness made of nichrome or tantalum (or other exotic metal). They are deposited onto a substrate by vacuum deposition or by rf sputtering under a vacuum. Thin-film resistors provide excellent tolerances, are very stable with temperature changes, but are costly to apply, necessitating the use of expensive vacuum equipment.

thin-film semiconductor—A semiconductor produced by the deposition of an appropriate single-crystal layer on a suitable insulator.

thin-film solar cell—A solar cell that is lightweight and flexible due to its construction by vacuum deposition of a semiconductor material (e.g., gallium arsenide or cadmium sulfide) onto a thin plastic or metal substrate. It is used as a power source in spacecraft because of its light weight.

think time—The time the user of a time-sharing system spends sitting at his or her terminal but not using the computer.

thin-walled conduit—Metallic tubing used to enclose insulated wires in an electrical circuit.

thin-wall ring magnet—A type of ceramic permanent magnet in which the axial length is greater than the wall thickness or the wall thickness is less than 15 percent of the outside diameter.

third harmonic—A sine-wave component having three times the fundamental frequency of a complex wave.

third-harmonic distortion—The rms third-harmonic voltage divided by the rms fundamental voltage. This value often is used as a measure of distortion in an essentially symmetrical system, such as ac-biased recording.

third-party traffic—Amateur radiocommunication by or under the supervision of the control operator at an amateur radio station on behalf of anyone other than the control operator.

thixotropic—1. A property of a paste or liquid that describes its ability to flow more readily when agitated or sheared. Thixotropy of a paste is a necessary condition for

screen ability. 2. Description of materials that are gel-like at rest but fluid when agitated.

thixotropy—The property of a coating compound that provides low viscosity during agitation, but will thicken to reduce runoff when allowed to stand for a short period.

Thomson bridge—See Kelvin bridge.

Thomson coefficient—The ratio of the voltage between two points on a metallic conductor to the difference in temperature between the same points.

Thomson effect—The production or absorption of heat (in addition to the I^2R loss) by a current between two points within a temperature gradient in a homogeneous conductor. Whether the heat is given off or absorbed depends on the direction of the current.

Thomson electromotive force—The voltage that exists between two points that are of different temperatures in a conductor.

Thomson heat—The thermal energy absorbed or produced due to the Thomson effect.

thoriated filament—A tungsten vacuum-tube filament to which a small amount of thorium has been added to improve emission. The thorium comes to the surface and is primarily responsible for the electron emission.

thread—See chip, 1.

three-address—Pertaining to an instruction format that contains three address parts.

three-address code—Also called instruction code. In computers, a multiple-address code that includes three addresses, usually two addresses from which data is taken and one address where the result is entered. Location of the next instruction is not specified, and instructions are taken from storage in preassigned order.

three-address instruction—1. In computers, an instruction that includes an operation and specifies the location of three registers. See also three-address code. 2. An instruction that can separately specify two sources and a destination.

three-channel stereo—A stereo recording or reproduction system that uses three spaced microphones for recording and three sound reproducers for playback.

three-conductor jack—Receptacle having three through circuits: tip, ring, and sleeve.

three-layer diode—Also called diac. A two-terminal voltage-controlled device exhibiting a bilateral negative resistance characteristic. The device has symmetrical switching voltages ranging from 20 to 40 volts and is specifically designed for use as a trigger in ac power-control circuits such as those using triacs.

three-level maser (or laser)—A maser or laser system that involves the ground state and two other energy levels. Laser action usually takes place between the intermediate and ground states. The pump populates the intermediate state by way of the highest state. When applied to a maser, this pump brings the population of the highest state and the ground state into equilibrium. Maser action may take place either between the upper and intermediate levels or between the intermediate and ground levels, depending on the relaxation times of the different transitions.

three-phase circuit—A combination of circuits energized by alternating electromotive forces that differ in phase by one-third of a cycle, or 120 electrical degrees. In practice, the phases may vary several degrees from the specified angle.

three-phase current—A current delivered through three wires—each wire serving as the return for the other two, and the three current components differing in phase successively by one-third of a cycle, or 120 electrical degrees.

three-phase, four-wire system—An ac supply system comprising four conductors: three connected as in a three-phase, three-wire system and the fourth to the neutral point of the supply, which may be grounded.

three-phase motor—1. An ac motor operated from a three-phase circuit. 2. A true polyphase induction motor with three or more power windings designed specifically to operate from a three-phase power source. It is self-starting.

three-phase, seven-wire system—A system of ac supply from groups of three single-phase transformers connected in a Y. Thus, a three-phase, four-wire, grounded-neutral system of a higher voltage for power is obtained, the neutral wire being common to both systems.

three-phase, three-wire system—An ac supply system comprising three conductors, between successive pairs of which are maintained alternating differences of potential successively displaced in phase by one-third of a cycle.

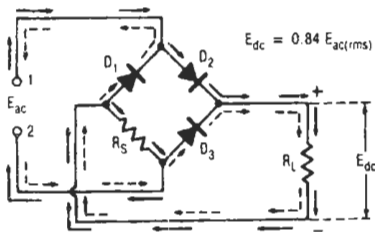
three-plus-one instruction—In digital computer programming, a four-address instruction in which one of the addresses always specifies the location of the next instruction to be performed.

three-pole switch—An arrangement of three single-pole switches coupled together to operate three contacts simultaneously.

three-position relay—Sometimes called a center-stable polar relay. A relay that may be operated to three distinct positions.

three-pulse cascade canceler—A moving-target indicator technique in which two 2-pulse cancelers are cascaded together. This improves the velocity response.

three-quarter bridge—A bridge connection in which one of the diode rectifiers has been replaced by a resistor.



Three-quarter bridge.

three-state—See tristate.

three-state logic—A logic family that may be in one of three states rather than the usual two—high, low, or high impedance. In the high-impedance state the output voltage is unaltered. Logic in a high-impedance state may be easily and permanently connected to a bus.

three-way speaker system—A sound-reproducing system using three separate speakers, each designed for a specific portion of the audio spectrum (high, low, and middle frequencies). The high- and low-frequency speakers are known as the tweeter and woofer, respectively.

three-way switch—A switch that can connect one conductor to any one of two other conductors.

three-wire system—A system of electric supply comprising three conductors, one of which (known as the neutral wire) is maintained at a potential midway between the potential of the other two (referred to as the outer conductors). Part of the load may be connected directly between the outer conductors, the remainder being divided

three-phase, four-wire system — threshold value

as evenly as possible into two parts, each of which is connected between the neutral and one outer conductor. There are thus two distinct supply voltages, one being twice the voltage of the other.

threshold—1. The point at which an effect is first produced, observed, or otherwise indicated. 2. In a modulation system, the smallest value of carrier-to-noise ratio at the input of the demodulator for all values above which a small percentage change in the input carrier-to-noise ratio produces a substantially equal or smaller percentage change in the output signal-to-noise ratio. 3. That point at which an indication exceeds the background or ambient. 4. A minimal signal-to-noise input required to allow a video receiver to deliver an acceptable picture.

threshold current—1. The minimum current at which a gas discharge becomes self-sustaining. 2. The minimum forward current for which the laser is in a lasing state at a specified temperature.

threshold decoding—A decoding procedure so arranged that the decision on the symbol that was transmitted is based on a majority count of the parity-check equations involving that symbol.

threshold element—A device that performs the logic threshold operation, but in which the contribution to the output determination by the truth of each input statement has a weight associated with that statement.

threshold field—The least magnetizing force in a direction that tends to decrease the remanence, which, when applied either as a steady field of long duration or as a pulsed field appearing many times, will cause a stated fractional change of remanence.

threshold frequency—The frequency at which the quantum energy is just sufficient to release photoelectrons from a given surface.

threshold of audibility—Also called threshold of detectability or threshold of hearing. For a specified signal, the minimum effective sound pressure of a signal capable of evoking an auditory sensation in a specified fraction of the trials. The characteristics of the signal, the manner in which it is presented to the listener, and the point at which the sound pressure is measured must all be specified. This threshold is usually expressed in decibels relative to 0.0002 microbar.

threshold of detectability—See threshold of audibility.

threshold of discomfort—Also called threshold of feeling. For a specified signal, the minimum effective sound-pressure level that, in a specified fraction of the trials by a battery of listeners, will stimulate the ear to the point at which the sensation of feeling becomes uncomfortable. This threshold is customarily expressed in decibels relative to 0.0002 microbar.

threshold of feeling—See threshold of discomfort.

threshold of hearing—See threshold of audibility.

threshold of luminescence—See luminescence threshold.

threshold of sensitivity—The smallest stimulus or signal that will result in a detectable output. This phrase is frequently used to describe the voltage point at which an operations monitor or event marker will trigger.

threshold signal—In navigation, the smallest signal capable of producing a recognizable change in the positional information.

threshold-triggered flip-flop—A flip-flop whose state changes when the actuating signal passes through a certain voltage level, regardless of the rate at which the voltage changes.

threshold value—1. The minimum input that produces a corrective action in an automatic control system. 2. The minimum level for which there is a measurable output.

threshold voltage — 1. The level of input voltage at which a binary logic circuit changes from one logic state to the other. 2. The voltage at which a pn junction begins to conduct current. 3. In a solid-state lamp, the voltage at which emission of light begins. 4. The minimum gate voltage needed to turn on an MOS enhancement-mode device.

throat — 1. Part of the flare or tapered parallel-plate guide immediately adjacent to and connected to the main run of a waveguide. 2. The smaller cross-sectional area of a horn.

throat microphone — A microphone worn around the throat and actuated by vibrations of the larynx as the user talks. It is used in jet airplanes, tanks, and other places where background noise would drown out the conversation.

through connection — 1. Electrical continuity between patterns on double-sided or multilayer boards established by means of plated-through holes or jumper wires. 2. An electrical connection between conductive patterns on opposite sides of an insulating base, e.g., plated-through hole or clinched jumper wire.

through path — The transmission path from the loop input signal to the loop output signal in a feedback control loop.

throughput — 1. A measure of the efficiency of a system; the rate at which the system can handle work. 2. The speed with which problems or segments of problems are performed in a computer. Throughput varies from application to application and is meaningful only in terms of a specific application. 3. The total useful information processed or communicated over a given period; expressed in bits per second, packets per second, or some similar measurement. This quantity is frequently used for system comparisons. For example, a communication system with a throughput of 50 messages per second is superior to a system with a throughput of 30 messages per second. 4. The total amount of data that can be manipulated per second. Throughput takes into consideration such machine characteristics as basic architecture, execution speed, logic capability, and software sophistication, but is more directly related to the size of a computer's real addressable memory

throughput rate — 1. The highest rate at which a multiplier can switch from channel to channel at its specified accuracy. This rate is determined by the settling time. 2. An a/d converter or a data-acquisition system can convert a finite number of points in any given time. Throughput rate is an expression of that quantity and depends both on the time required to make a conversion and the time required to set up the unit to make the next conversion. In a data-acquisition system, throughput rate includes the effects of the composite delay arising from switching and settling times of the MUX, settling time of the amplifier, and acquisition time of the sample-and-hold.

through repeater — A microwave repeater that is not equipped to provide for connections to any local facilities other than the service channel.

through transfer function — The transfer function of the through path in a feedback control loop.

throw — 1. In an electric motor or generator, the number of core slots spanned between the bottom leg of a coil and the top leg of the same coil. 2. Movement of a contact from one stationary point to another. A single-throw switch has a normally open or a normally closed circuit per pole. A double-throw switch has a normally open and a normally closed circuit per pole.

throwing power — Referring to the ability of an anode used in an impressed-current cathodic-protection system to distribute its current over a large surface. It is principally dependent upon the anode voltage, current,

surface area, position of the anode with respect to the cathode, and the salinity and flow velocity of the water.

throw-out spiral — See lead-out groove.

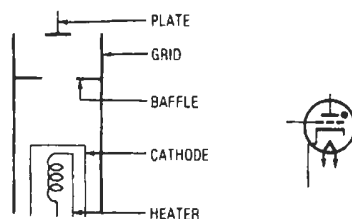
thru-hole connection — Also called feed-thru connection and plated-through hole. A conductive material used to make electrical and mechanical connections between the conductive patterns on opposite sides of a printed circuit board.

thru repeater — In a microwave system, a repeater station that is not equipped to be connected to any local facilities other than the service channel.

thumbwheel switch — A rotating numeric switch used to input numeric information to a controller.

thump — 1. A low-frequency transient disturbance in a system or component. 2. The noise caused in a receiver by telegraph currents when the receiver is connected to a telephone circuit on which a direct-current telegraph channel is superimposed. 3. A brief, unwanted low-frequency noise (transient) that may occur when system power is turned on or off and is due to a lack of control in certain amplifier stages at that time.

thyatron — 1. A hot-cathode gas tube in which one or more control electrodes initiate the anode current, but do not limit it except under certain operating conditions. 2. A gas-filled triode in which a sufficiently large positive pulse applied to the control grid ionizes the gas and initiates conduction. Thereafter, the grid has no further effect, but conduction can be halted by reducing the plate voltage to zero (or less), or by reducing plate current to a value too small to maintain ionization.



Cross-section.

Schematic symbol.

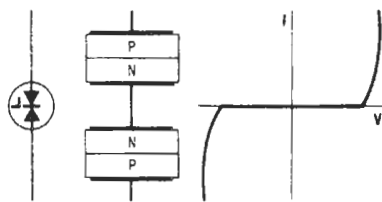
Thyatron.

thyatron gate — In computers, an AND gate consisting of a multielement gas-filled tube in which conduction is initiated by the coincident application of two or more signals. Conduction may continue after one or more of the initiating signals have been removed.

thyatron inverter — An inverter circuit in which thyatron tubes convert the dc power to ac power.

thyractor — A silicon diode that acts as an insulator until its rated voltage is reached, and as a conductor above that voltage. It is used for ac surge-voltage protection.

thyristor — 1. A bistable device comprising three or more junctions. At least one of the junctions can switch between reverse and forward voltage polarity within a single quadrant of the anode-to-cathode voltage-current characteristics. Used in a generic sense to include silicon controlled rectifiers and gate-control switches, as well as multilayer two-terminal devices. (Many countries use the term thyristor in place of the term pnpn-type switch.) 2. Member of a family of semiconductor switching devices of which the silicon controlled rectifier (SCR) and the triac are the most commonly used. Thyristors are fabricated from four alternate layers of positive (p) and negative (n) semiconductor material. 3. An SCR or triac



Symbol. Junctions. Characteristic.

Thyrector.

(which is a form of SCR) that can be used for switching both positive and negative half cycles of ac. 4. A member of a class of semiconductor devices (made of at least four alternate p-n-p-n layers) that snap to a completely on state for working current when a momentary pulse of control current is received and can (typically) be turned off only by interrupting the working current. Thyristors are mostly high-power devices. 5. A bistable semiconductor device comprising three or more junctions that can be made conductive at any instant when the anode (or principal) voltage is positive. The term thyristor may be used either as a generic term or as an abbreviation for reverse-blocking triode thyristor. 6. A device with turn-on characteristics that can be controlled by externally applied voltage or current. These devices generally consist of several interconnected layers of p- and n-type semiconductor material.

thyrite—A silicon-carbide ceramic material with nonlinear resistance characteristics. Above a critical voltage, the resistance falls considerably.

THz—Letter symbol for terahertz (10^{12} hertz).

tickler—A small coil connected in series with the anode circuit of an electron tube and inductively coupled to a grid-circuit coil. The tickler coil is used chiefly in regenerative detector circuits, to establish feedback or regeneration.

tie cable—1. A cable between two distributing frames or distributing points. 2. A cable between private branch exchanges. 3. A cable between a private branch exchange switchboard and the main office. 4. A cable connecting two other cables.

tie line—1. *See* interconnection, 1. 2. A private-line communication channel of the type communications common carriers provide for joining two or more points.

tie point—1. An insulated distributing point (other than an active terminal connection) where junctions of component leads are made in circuit wiring. 2. An insulated terminal to which two or more wires are connected.

tier array—An array of antenna elements, one above the other.

ties—1. Electrical connections or straps. 2. Tie wires.

tie trunk—A telephone line or channel directly connecting two private branch exchanges.

tie wire—Wire that connects a number of terminals together.

tie wires—Short pieces of wire used to tie open-line wires to insulators.

TIFF—*See* tagged image file format.

.TIF files—Tagged image file format files. Bit-mapped graphic images popular among desktop publishers.

TIG—Abbreviation for tungsten inert-gas welding. A technique using a tungsten electrode, generally without a filler material. Popular for light-metal gages and high-precision work.

tight coupling—*See* close coupling.

tilt—1. In radar, the angle between the axis of radiation in the vertical plane and a reference axis, which is normally the horizontal. 2. *See* wave tilt. 3. The angle an antenna makes with the horizontal. 4. A deviation from the ideal low-frequency response; unsatisfactory low-frequency response.

tilt angle—In radar, the angle between the vertical axis of radiation and a reference axis (normally the horizontal).

tilt controls—In a color television receiver employing the magnetic-convergence principle, the three controls used to tilt the vertical center rows in the three colored patterns produced by a dot-generator signal.

tilt error—1. In navigation, the ionospheric error component due to nonuniform height. 2. The difference between the true tilt and the mechanical tilt. The sign is such that when it is algebraically added to the mechanical tilt, the result is the true tilt. *See also* antenna tilt error.

tilting—1. Forward inclination of the wavefront of radio waves traveling along the ground. The amount of tilt depends on the electrical constants of the ground. 2. Changing the angle of a television camera to follow a moving object being televised. 3. Changing the vertical angle of a directional antenna.

TIM—Abbreviation for transient intermodulation distortion.

timbre—Also called tone color or musical quality.

1. The character of a musical tone that distinguishes one musical instrument from another playing the same note. The difference between two steady tones having the same pitch and degree of volume is called the difference in timbre. Timbre depends mostly on the relative intensity of the different harmonics and the frequencies of the most prominent harmonics. 2. The tonal quality of sound based on the pitch and the relative mix of fundamental and harmonic frequencies.

time—The measure of the duration of an event. The fundamental unit of time is the second.

time assignment speech interpolation—Telephone switching equipment whereby a person is connected to idle circuits when he starts talking, and is disconnected when he stops talking.

time base—A voltage generated by the sweep circuit of a cathode-ray-tube indicator. Its waveshape is such that the trace is either linear with respect to time or, if nonlinear, is still at a known timing.

time clock—A loosely used term sometimes referring to time switches, sometimes to interval timers, or to any type of timer.

time-code generator—A timer with an absolute time reference having digital outputs suitable for machine interpretation. Dial or numeric display may be included.

time-compression multiplexing—A method of providing the appearance of full-duplex communication over a single twisted-pair half-duplex copper loop. Data are buffered at each end and sent across the line at double the subscriber data rate, with the two ends taking turns.

time constant—1. The time required for an exponential quantity to change by an amount equal to 0.632 times the total change that will occur. Specifically: (a) In a capacitor-resistor circuit, the number of seconds required for the capacitor to reach 63.2 percent of its full charge after a voltage is applied. The time constant of a capacitor having a capacitance C in farads in series with a resistance R in ohms is equal to $R \times C$. (b) In an inductor-resistor circuit, the number of seconds required for the current to reach 63.2 percent of its final value. The time constant of an inductor having an inductance L in henrys and resistance R in ohms is equal to L/R . 2. The time required for a motor to accelerate from 0 to 63.2 percent of its final no-load speed when the rated voltage, with the

proper phase relationship, is applied. 3. A measure of the rapidity with which a transducer responds to a change in temperature. It is the time required for the sensor to complete 63.2 percent of its exponential response to a step change in temperature and is highly dependent on the thermal conductivity of the medium measured. Time constant must match the speed of which it is a part. In general, small sensors respond more rapidly than large ones.

time constant of a capacitor—The product of the insulation resistance and the capacitance of a capacitor.

time constant of fall—The time required for a pulse to fall from 70.7 percent to 26.0 percent of its maximum amplitude, excluding spikes.

time-current characteristics of a fuse—The relation between the root-mean-square alternating current or direct current and the time for the fuse to perform the whole or some specified part of its interrupting function. Usually shown as a curve.

timed acceleration—A control function that automatically controls the speed increase of a drive as a function of time.

time date generator—A device used in surveillance that electronically produces a single-row display of day, time, and date information on any standard TV screen (or raster).

timed deceleration—A control function that automatically controls the speed decrease of a drive as a function of time.

time delay—1. The time required for a signal to travel between two points in a circuit. 2. The time required for a wave to travel between two points in space. 3. The total elapsed time or lag required for a given command to be effected after the command is given. 4. Also called envelope delay. The slope of the phase-versus-frequency curve at a specified frequency. In a loose sense, this is the time it takes a designated point in a wave to pass through a filter.

time-delay circuit—A circuit that delays the transmission of an impulse signal, or the performance of a transducer, for a definite desired length of time.

time-delay closing relay—See time-delay starting relay.

time-delay generator—A device that accepts an input signal and provides a delay in time before the initiation of an output signal.

time-delay relay—Also called slow-action relay. 1. A relay in which there is an appreciable interval of time between the energizing or deenergizing of the coil and the movement of the armature (e.g., slow-operating relays and slow-release relays). 2. A device in which a defined delay occurs between the application or removal of the control current and the switching of the load current. 3. An electronic device with either relay or solid-state output that performs a retarding function on receipt of instruction. 4. A reset timer with delayed contacts. 5. A relay with electromagnetic action that provides a specified time interval between the energizing of the coil and the actual contact closure. The timing interval can be preset and the delay may be achieved either by mechanical clockwork or electronic means.

time-delay spectrometry—An acoustic measurement technique utilizing a real-time spectrum analyzer.

time-delay starting relay—Also called time-delay closing relay. A device that functions to give a desired amount of time delay before or after any point or operation in a switching sequence or protective relay system.

time-delay stopping or opening relay—A time-delay device that serves in conjunction with the device that initiates the shut-down, stopping, or opening operation in an automatic sequence.

time-derived channel—Any of the channels obtained by time-division multiplexing of a channel.

time discriminator—A circuit in which the sense and magnitude of the output is a function of the time difference of, and relative time sequence between, two pulses.

time-distribution analyzer—Also called time sorter. An instrument that indicates the number or rate of occurrence of time intervals falling within one or more specified ranges. The time interval is defined by the separation between members of a pulse pair.

time-division data link—Radiocommunications that use time-division techniques for channel separation.

time-division multiplex channel—A path established for a segment of time during which the central station equipment obtains a signal indicating the status of a signal-encoding device.

time-division multiplexer—A device that samples all data input from different low-speed devices, and retransmits all the samples in an equal amount of time.

time-division multiplexing—Abbreviated TDM. 1. Multiplexing by assigning each low-speed channel its own time slot during which it transmits data. 2. A process by which two or more channels of information are transmitted over the same link by allocating a different time interval for the transmission of each channel. 3. A signaling method characterized by the sequential and noninterfering transmission of more than one signal in a communication channel. Signals from all terminal locations are distinguished from one another by each signal occupying a different position in time with reference to synchronizing signals. 4. A system of multiplexing in which channels are established by connecting terminals one at a time at regular intervals by means of an automatic distribution. 5. The multiplexing technique that provides for the independent transmission of several pieces of information on a time-sharing basis by sampling, at frequent intervals, the data to be transmitted. 6. A data-communication technique for combining several lower-speed channels into one facility or transmission path at a higher speed; each low-speed channel is allotted a specific position in the signal stream based on time. Thus, the information on the low-speed input channels is interleaved at higher speed on the multiplexed channel. At the receiver, the signals are separated to reconstruct the individual low-speed channels.

time domain—1. An analysis of a waveform in terms of how the parameter of interest, voltage for example, varies with time. (The sine wave can help to visualize this concept. At any instant in time the voltage has only a single unique value. But as time progresses, the voltage rise and fall describes the familiar smooth curve. A square wave, on the other hand, is a picture in the time domain of a voltage that repeatedly changes abruptly from one value to another.) 2. A measurement technique where the results are plotted or shown against a scale of time, in contrast to frequency domain where the results are plotted on a scale of frequency.

timed-release circuit—A circuit designed to automatically release other connected circuits after a preset interval.

time-edit—To prevent the time code in a computer from being recorded or transmitted when no data samples are being passed, or, conversely, to record or transmit the time code with each data sample passed.

time flutter—A variation in the synchronization of components of a radar system, leading to variations in the position of the observed pulse along the time base and reducing the accuracy with which the time of arrival of a pulse may be determined.

time frame — In telemetry, the time period containing all elements between corresponding points of two successive reference markers.

time gain — *See* sensitivity-time control.

time gate — A transducer that has an output during chosen time intervals only.

time harmonics — High-frequency components generated by nonlinearity in a resolver magnetic circuit. In ac resolvers with no dc components present, time harmonics are odd multiples of the fundamental frequency. Time harmonics appear as a component of null voltage.

time-interval selector — A circuit that functions to produce a specified output pulse when and only when the time interval between two input pulses is between set limits.

time lag — 1. The interval between application of any force and full attainment of the resultant effect. 2. The interval between two phenomena.

time-lapse VTR — A videotape recorder that provides a continuous record of events over a period of from 12 to 48 hours on one reel of videotape.

time-mark generator — A circuit that produces accurately spaced pulses for display on the screen of an oscilloscope.

time modulation — Modulation in which the time of occurrence of a definite part of a waveform is made to vary in accordance with a modulating signal.

time of persistence — The time that elapses between the instant of removal of the excitation and the instant at which the luminance or radiance has dropped to a stated fraction of its initial value, usually 10 percent.

time-out — The interval of time allotted for certain operations to occur (for example, response to polling or addressing) before operation of the system is interrupted and must be started again.

time pattern — A picture-tube presentation of horizontal and vertical lines or rows of dots generated by two stable frequency sources operating at multiples of the line and field frequencies.

time phase — Reaching corresponding peak values at the same instants of time, though not necessarily at the same points in space.

time pulse distributor — A device or circuit for allocating timing pulses or clock pulses to one or more conducting paths or control lines in a specified sequence.

time quadrature — Differing by a time interval corresponding to one-fourth the time of one cycle of the frequency in question.

timer — 1. A special clock mechanism or motor-operated device used to perform switching operations at predetermined time intervals. 2. An assembly of electric circuits and associated equipment that provides the following: trigger pulses, sweep circuits, intensifier pulses, gate voltage, blanking voltages, and power supplies. 3. The part of a radar set that initiates pulse transmission and synchronizes this with the beginning of indicator sweeps, timing of gates, range markers, etc. *See also* synchronizer, 1. 4. An instrument that measures the interval between events. The term *event* may encompass anything from persons moving through a turnstile to oscillations in the highest-frequency radar bands.

time resolution — The smallest interval of time that can be measured with a given system.

time response — An output, expressed as a function of time, that results from a specified input applied under specified operating conditions.

timer motor — A synchronous clock motor having a definite output speed determined by the number of poles in the stator and the reduction of the associated gear train.

time sequencing — In a computer, switching signals generated by a program purely as a function of accurately measured elapsed time.

time series analysis — Analysis of any variable classified by time, in which the values of the variable are functions of the time periods.

time share — To use a device for two or more purposes on a time-sharing basis.

time sharing — 1. A method of operation in which a computer facility is shared by several users for different purposes at (apparently) the same time. Although the computer actually services each user in sequence, the high speed of the computer makes it appear as if the users were all handled simultaneously. 2. A means of making more efficient use of a facility by allowing more than one using activity access to the facility on a sequential basis. 3. A computer system in which CPU time and system resources are shared simultaneously by several operators engaged in unrelated tasks and located at terminals remote from the central processing unit. The speed of the computer gives the appearance of simultaneously performing multiple jobs. Programs performing the individual jobs are swapped at high speeds under direction of the scheduling formulas or plan for the time-sharing system, thus assuring each user a system response within a few seconds (almost the exact opposite of a batch system). 4. The use of the same computer memory for two or more simultaneous tasks.

time-sharing system — *See* TSS.

time signals — Time-controlled radio signals broadcast by government-operated radio station WWV at regular intervals each day on several frequencies.

time signal service — Radiocommunication service for the transmission of time signals of stated high precision, intended for general reception.

time slicing — 1. The sharing of CPU time among several software processes by giving each process a defined interval (slice) of the CPU's time. 2. A type of operation in which a computer works on one program for a short time, then goes to another program and works on that for a short time, and so forth. 3. A technique that shares microprocessor time among several processes. A quantum of time allocated to a process is termed a time slice.

time sorter — *See* time-distribution analyzer.

time stability — The degree to which a component value is maintained to a stated degree of certainty (probability) under stated conditions of use over a stated period of time. It is usually expressed in $\pm$ percent or $\pm$ per unit (ppm) change per 1000 hours of continuous use.

time switch — A clock-controlled switch used to open or close a circuit at one or more predetermined times. Usually refers to repeat cycle timers with a dial graduated with time of day (in 24-hour type) or with time and day (in 7-day type). Has means of adjusting the time when circuits are turned on or off, usually with pins or clips. Used for turning lights on at night, ringing bells in offices, schools, etc.

time-to-digital conversion — The process of converting an interval of time into a digital number.

time window — In random-sampling-oscilloscope technique, the part of the signal period that is displayed.

timing — The procedure of adjusting the ignition distributor so the sparks will occur at the spark plugs at the correct time in relation to the position of the piston on the compression stroke.

timing axis oscillator — *See* sweep generator.

timing lag — The number of engine degrees retard in timing caused by electrical lag in the system. Generally stated as number of engine degrees per 1000 rpm engine speed.

timing light—A stroboscope unit that is connected to the secondary ignition circuit of an internal-combustion engine to produce flashes of light in unison with the firing of a specific spark plug. By directing these flashes of light on the whirling timing marks, the marks appear to stand still. By adjusting the distributor, the timing marks may be properly aligned, thus setting the timing.

timing-pulse distributor—Also called waveform generator. A computer circuit driven by pulses from the master clock. It operates in conjunction with the operation decoder to generate timed pulses needed by other machine circuits to perform the various operations.

timing relay—A form of auxiliary relay used to introduce a definite time delay in the performance of a function.

timing signal—Any signal recorded simultaneously with data to provide a time index.

timing tape—A variety of leader tape having printed indications of intervals of $7\frac{1}{2}$ inches (19.05 cm) along its length to facilitate measuring off a desired number of seconds' worth of leader.

tinkertoy—An attempt at modularization whereby wafers, with one or more component parts printed or mounted on them, are stacked vertically, with interconnecting wiring stiff enough to provide support running through holes around the periphery of the wafer.

tin-lead—An alloy used for the majority of soldering operations in the electronics industry. Usually, an alloy close to the eutectic composition (62 percent tin, 38 percent lead) is chosen to permit usage of the lowest possible soldering temperature, thereby reducing risk of damage to temperature-sensitive components.

tinned—Covered with metallic tin to permit easy soldering.

tinned wire—A copper wire that has been coated with a layer of tin or solder to prevent corrosion and to simplify soldering.

tinning—A process of coating a conductor surface with solder.

tinsel—Flat ribbons of bronze, silver, or copper alloy spiraled around a textile core of cotton, nylon, etc. Used in telephone and electronics applications as conductors in line cords, microphone cords, and retractile cords.

tinsel conductor—A type of electrical conductor comprising a number of tiny threads, each thread having a fine, flat ribbon of copper or cadmium bronze closely spiraled about it. Used for small cables requiring limpness and extra-long flex life (e.g., used with headsets or handsets).

tinsel wire—1. A very flexible conductor made by wrapping one or more thin ribbon conductors over a nylon string core. Used to make telephone cords. 2. A low-voltage stranded wire in which each strand is a very thin conductor ribbon spirally wrapped around a textile yarn. Insulation is generally a textile braid. Intended usage is for severe flexing.

tint—A mixture of a color with white light.

tip—1. The contacting part at the end of a plug or probe. 2. Also called tip side. The end of the plug used to make circuit connections in a manual switchboard. The tip is the connector attached to the positive side of the common battery that powers the station equipment. By extension, it is the positive battery side of a communications line.

tip and ring—Traditional telephone terminology for *positive* and *negative*. In old-style telephone switchboards, the tip (positive) wire was the one that connected to the tip of the plug; the ring (negative) wire was connected to a slip ring in the jack.

tip jack—Also called a pup jack. A small single-hole jack for a single-pin contact plug.

tip mass—The effective mass at the tip of the stylus of a pickup cartridge. (Modern techniques have reduced this mass toward 1 milligram or below.)

tipoff—The last portion of a vacuum-tube bulb to be melted and sealed after evacuation of the bulb.

tip-ring-sleeve (TRS) phone plug—A three-conductor phone plug commonly used for balanced audio connections.

tip side—Also called a tip wire. The conductor of a circuit associated with the tip of a plug or the tip spring of a jack. *See also* tip, 2.

tip-sleeve (TS) phone plug—A two-conductor phone plug (or jack) commonly used for unbalanced audio connections.

tip wire—*See* tip side.

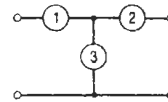
T-junction—*See* tee junction.

TM wave—Abbreviation for transverse magnetic wave.

$Tm_{m,n}$ wave—In a rectangular waveguide, the transverse magnetic wave for which m and n are the number of half-period variations of the magnetic field along the longer and shorter transverse dimensions, respectively.

TNC—A threaded connector for miniature coax; TNC is said to be short for threaded-Neill-Concelman. (Contrast with BNC.)

T-network—A network composed of three branches. One end of each branch is connected to a common junction point. The three remaining ends are connected to an input terminal, an output terminal, and a common input and output terminal.



T-network.

TO can—Abbreviation for transistor-outline metal-can package.

TO-5—A small cylindrical IC package about 0.375 inch (9.5 mm) in diameter and made of metal; it can have up to 12 pins protruding from the bottom of the can.

to-from indicator—An instrument that forms part of the omnirange facilities and is used for resolving the 180° ambiguity.

toggle—1. A flip-flop. The term implies that the flip-flop will change state upon receipt of a clock pulse, and is used mainly with reference to flip-flops connected as a counter, in which the process of changing state is called toggling. 2. To use switches to enter data into the memory of a computer. 3. To change states abruptly in such a way that the process goes to completion once a critical point is reached, even if the actuating cause is removed; in logic circuits, a change of state of a flip-flop or Schmitt trigger. 4. *See* T flip-flop. 5. The ability, through the use of a windowing program, to allow a user to switch back and forth between different PC applications programs, as well as between PC and mainframe or mini applications.

toggle frequency—In a digital circuit, the number of times per second that the circuit changes state.

toggle rate—Twice the frequency at which a flip-flop completes a full cycle encompassing both states. Usually used to denote the maximum input frequency that a flip-flop can follow.

toggle switch—1. A switch with a projecting lever whose movement through a small arc opens or closes

one or more electric circuits. 2. A panel-mounted switch with an extended lever; normally used for on/off switching. 3. A switch having a lever (toggle), the movement of which results either directly or indirectly in the connection or disconnection of the switch terminations in a specified manner. Any indirect action through an actuating mechanism should be such that the speed of connection and/or disconnection is independent of the speed of lever movement.

tokamak — A doughnut-shaped plasma confinement device for research into the problems associated with nuclear fusion.

token — 1. A group of bits used in some bus networks to signal network access by a particular station. 2. The information package that contains a piece of data and a description of its location in a computer program.

token passing — A protocol that gives a terminal permission to transmit on a token ring LAN. A unique bit pattern, called a token, circulates around the ring from terminal to terminal. The terminal that possesses the token has permission to transmit.

token ring network — A local area network (LAN) in a circle configuration. Messages are sent when one computer attaches a message to a special bit pattern (called a token) as it travels around the circle.

tolerance — 1. A permissible deviation from a specified value. A frequency tolerance is expressed in hertz or as a percentage of the nominal frequency; an orientation tolerance, in minutes of arc; a temperature tolerance, in degrees Celsius; and a dimensional tolerance, in decimals or fractions. 2. A permissible deviation from specified capacitance (resistance, inductance, etc.) values, characteristics, and physical dimensions. 3. A specified allowance for error from a desired or measured quantity. 4. Maximum error or variation from the standard permissible in a measuring instrument. 5. Maximum electrical or mechanical variation from specifications that can be tolerated without impairing the operation of a device.

toll — 1. In public switched systems, a charge for a connection beyond an exchange boundary, based on time and distance. 2. Any part of telephone plant, circuits, or services for which toll charges are made.

toll call — 1. Telephone call to points beyond the area within which telephone calls are covered by a flat monthly rate or are charged for on a message unit basis. 2. A telephone call, subject to charge, for a destination outside of the local service area of the calling station.

toll center — Also called toll office and toll point. 1. The basic toll switching entity; a central office where channels and toll-message circuits terminate. While this is usually one particular central office in a city, larger cities may have several central offices where toll-message circuits terminate. 2. A major telephone distribution center that distributes calls from one major metropolitan area to another.

toll-free number — See enterprise number.

toll office — See toll center.

toll point — See toll center.

toll restriction — The action of preventing restricted telephones from making calls to toll or other restricted points. A restrictor counts the first three digits dialed and diverts calls to forbidden codes either to a busy tone, a recorded announcement, or an operator.

toll-terminal loss — On a toll connection, that part of the overall transmission loss attributable to the facilities from the toll center through the tributary office to and including the subscriber's equipment.

tone — 1. A sound wave capable of exciting an auditory sensation having pitch. 2. A sound sensation having pitch.

tonearm — 1. The pivoted arm of a record player that extends over the record and holds the pickup cartridge. Wires from the cartridge run through the arm to the preamplifier, usually located on the underside of the turntable mounting board. 2. The portion of a record player that supports the phono cartridge and maintains it in the correct relationship to the record surface and the spiral groove. On conventional pivoted tonearms, the cartridge is mounted at an offset angle and with a slight overhang beyond the turntable center to reduce the tracking error. The mass of the cartridge and the forward portion of the arm is balanced by an adjustable counterweight, and the desired vertical tracking force is supplied by a slight mass unbalance or a spring.

tone burst — A single sine-wave frequency, 50 to 500 microseconds long, having a rectangular envelope, used for testing the transient response of speakers.

tone channel — An intelligence or signaling circuit in which on-off or frequency-shift modulation of a frequency (usually an audio frequency) is used as a means of transmission.

tone control — 1. A control, usually part of a resistance-capacitance network, used to alter the frequency response of an amplifier so that the listener can obtain the most pleasing sound. In effect, a tone control accentuates or attenuates the bass or treble portion of the audio-frequency spectrum. 2. A circuit designed to increase or decrease the amplification in a specific frequency range, with little or no effect at other frequencies. Bass tone controls usually affect frequencies below a turnover frequency that may vary between 100 and 1000 Hz. Treble tone controls are typically hinged to affect frequencies above 1500 Hz. The range of a tone control (the maximum amount by which it can vary the amplification within its operating range) is typically about ± 15 dB, but may be as low as ± 7 dB or as great as ± 20 dB. (Equalizers can provide tone control over five or more frequency bands.)

tone dialing — See pushdown dialing.

tone generator — A device for providing an audio-frequency current suitable for testing audio-frequency equipment or for signaling.

tone keyer — An instrument device that converts direct-current impulses to audio tones, for line transmission or for keying a transmitter.

tone localizer — See equisignal localizer.

tone-modulated waves — Waves obtained from continuous waves by amplitude-modulating them at an audio frequency in a substantially periodic manner.

tone modulation — A type of code-signal transmission obtained by causing the radio-frequency carrier amplitude to vary at a fixed audio frequency.

tone pad — An array of 12 or 16 numbered keys that generate the standard telephone dual-tone multifrequency (DTMF) dialing signals.

toner — 1. Charged carbon particles, dry or suspended in a liquid solvent, used to produce a dark image on a light medium. 2. Minute, dry particles of resin and carbon black that are used to create images. In the electrostatic copying process, toner is capable of accepting an electrical charge. It is carried to the photoconductor by a developer medium and transferred to the surface of a copy sheet by a series of successively greater electrical charges.

tone reversal — Distortion of the recorder copy in facsimile. It causes the various shades of black and white not to be in the proper order.

tone signaling — The transmission of supervisory, address, and alerting signals over a telephone circuit by means of voice frequency tones. Also used in "touch tone" dialing.

tongue—The portion of a solderless terminal that projects from the barrel.

Tonotron—A multimode, selective-erasure storage tube.

tool function—In automatic control of machine tools, a command that identifies a specific tool and calls for the use of that tool.

TO package—Can-type IC chip configuration, an outgrowth of the original TO transistor package. Most common are the TO-5, TO-18, and TO-47. The IC chip is mounted within the package, interconnected to terminals on the can, and then hermetically sealed. TO stands for transistor outline.

top cap—A terminal in the form of a metal cap at the top of some vacuum tubes and connected to one of the electrodes.

top-down programming—See structured programming.

top-hat resistors—Film resistors having a projection on one side allowing a notch to be cut into the center of the projection to effectively form a serpentine resistance and thereby increase the resistivity.

top-loaded vertical antenna—A vertical antenna that is larger at the top, resulting in a modified current distribution that gives a more desirable radiation pattern vertically. A series reactor may be connected between the enlarged portion of the antenna and the remaining structure.

topology—1. The physical arrangement and relationship of interconnected nodes and lines in a network. Linear bus, mesh, star, token ring, and point-to-point are the major LAN topologies. 2. The surface layout of the elements comprising an IC.

tornadotron—A millimeter wave device that generates radio-frequency power from an enclosed, orbiting electron cloud excited by a radio-frequency field when subjected to a strong, pulsed magnetic field.

torn-tape relay—A method of receiving messages in tape form, breaking the tape, and retransmitting the message in tape form.

torn-tape switching center—A location at which operators tear off the incoming printed and punched paper tape and transfer it manually to a machine for transmission over the proper outgoing circuit.

toroid—1. A surface, or its closed solid, generated by any closed plane rotating about a straight line in its own plane—the resulting configuration being doughnut shaped. 2. A highly efficient type of coil wound on a ring or doughnut type of core. The toroid provides for high concentrated magnetic field within itself, and has a minimum magnetic flux leakage (external field).

toroidal coil—A coil wound in the form of a toroidal helix.

toroidal core—A ring-shaped core.

toroidal permeability—Under stated conditions, the relative permeability of a toroidal body of the given material. The permeability is determined from measurements of a coil wound on the toroid such that stray fields are minimized or can be neglected.

torque—A force that tends to produce rotation or twisting.

torque amplifier—A device with input and output shafts and supplying work to rotate the output shaft so that its position corresponds to that of the input shaft but does not impose any significant torque on the latter.

torque-coil magnetometer—A magnetometer that depends for its operation on the torque developed by a known current in a coil capable of turning in the field to be measured.

torque gradient—The torque required in inch-ounces to pull a specific energized synchro 1° away from its normal position.

torque motors—A motor that is designed to provide its maximum torque under the condition of stall or locked-rotor. A second criteria of torque motors is that they must be capable of remaining in a stalled condition for prolonged periods.

torque of an instrument—Also called deflecting torque. The turning moment produced on the moving element by the quantity to be measured or by some quantity dependent thereon acting through the mechanism.

torquer—A device that produces torque about an axis of freedom in response to a signal input.

torque-to-inertia ratio—See acceleration at stall.

torr—The unit of pressure used in the measurement of a vacuum. It is equal to $1/760$ of a standard atmosphere, and for practical purposes may be considered equivalent to one millimeter of mercury (mm Hg).

torsiometer—An instrument for measuring the amount of power that a rotating shaft is transmitting.

torsion galvanometer—A galvanometer in which the force between the fixed and moving systems is measured by the angle through which the supporting head of the moving system must be rotated to return the moving system to zero.

torsion-string galvanometer—A sensitive galvanometer in which the moving system is suspended by two parallel fibers that tend to twist around each other.

total capacitance—The capacitance between a given conductor and all other conductors in a system when all other conductors are connected together.

total combined regulation—The change in output of a regulated power supply arising from simultaneous changes in all of the specified operating conditions, when the direction of such changes is such as to make their effects additive. It may be stated as a percentage of the specified output and/or as an absolute value.

total connected load—The total current drawn in amperes, or power consumption in watts, of all of the utilization equipment connected to all or any given segment of a wiring system.

total distortion—The sum total of all forms of signal distortions.

total emission—The magnitude of the current produced when electrons are emitted from a cathode under the influence of a voltage such that all the electrons emitted are drawn away from the cathode.

total emissivity—The ratio of radiation emitted by a surface to the radiation emitted by the surface of a blackbody under identical conditions. Important conditions that affect emissivity of a material are surface finish, color, temperature, and wavelength of radiation. Emissivity may be expressed for radiation of a single wavelength (monochromatic emissivity), for total radiation of a specified range of wavelengths (total spectral emissivity), or for total radiation of all wavelengths (total emissivity).

total excursion—The application of a stimulus, in a controlled manner, over the span of an instrument.

total flux—The luminous flux emitted by a light source in all directions.

total harmonic distortion—Abbreviated THD. 1. The ratio of the power at the fundamental frequency, measured at the output of the transmission system considered, to the power of all harmonics observed at the output of the system because of its nonlinearity, when a single-frequency signal of specified power is applied to the input of the system. It is expressed in decibels. 2. The square root of the sum of the squares of the root-mean-square harmonic voltages divided by the root-mean-square fundamental voltage. 3. The ratio of the sum of

the amplitudes of all signals harmonically related to the fundamental and the amplitude of the fundamental signal. 4. A measure of the distortion produced in an audio system as a result of the production, by the system, of harmonics or multiples of the original audio signal.

total internal reflection—When light passes from one medium to another that is optically less dense (e.g., from glass to air), the ray is bent away from the normal. If the incident ray meets the surface at such an angle that the refracted ray must be bent away at an angle of more than 90°, the light cannot emerge at all, and is totally internally reflected.

totalizing—To register a precise total count from mechanical, photoelectric, electromagnetic, or electronic inputs or detectors.

total losses of a ferromagnetic part—Under stated conditions, the power absorbed and then dissipated as heat when a body of ferromagnetic material is placed in a time-varying magnetic field.

total losses of a transformer—The losses represented by the sum of the no-load and load losses.

total luminous flux—The total light emitted in all directions by a light source.

totally enclosed motor—A motor so enclosed as to prevent the free exchange of air between the inside and the outside of the case, but not sufficiently enclosed to be termed airtight.

totally unbalanced currents—See push-push currents.

total range of an instrument—Also called the range of an instrument. The region between the limits within which the quantity measured is to be indicated or recorded.

total regulation—The arithmetic sum of changes in output of a regulated power supply arising from changes in each of the specified operating conditions (current, voltage, or power) when such changes are applied individually and in a manner to make their effects additive. It may be stated as a percentage of the specified output and/or as an absolute value.

total resistance—The dc resistance of a (precision) potentiometer between the input terminals with the shaft positioned so as to give a maximum resistance value.

total spectral emissivity—See total emissivity.

total telegraph distortion—Telegraph transmission impairment expressed in terms of time displacement of mark-space and space-mark transitions from their proper positions and given in percent of the shortest perfect pulse, called the unit pulse.

total transition time—In a circuit, the time interval between the point of 10 percent input change and the point of 90 percent output change. It is equal to the sum of the delay time and rise (or fall) time.

totem pole amplifier—A push-pull amplifier circuit that provides a single-ended output signal without the use of a transformer. Used mainly in the output stages of transistor audio amplifiers.

TO-3—A large metal IC housing, approximately 1.5 × 11 inch (3.8 × 2.5 cm) having up to eight pins. When properly heat-sunked, this case is used where high-power dissipation takes place.

touch call—See pushdown dialing.

touch control—A control circuit that actuates a circuit when two metal areas or a preselected area are bridged by one's finger or hand.

touchscreen—A touch-sensitive display screen, whereby users can interact with a computer and select options by simply pointing with a finger instead of using a pointing device such as a mouse. Typically used in a kiosk.

touch sensitivity—The sensitivity of a capacitance sensor at which the alarm device will be activated only if an intruder touches or comes in very close proximity (about 1 cm or 0.39 in) to the protected object.

Touch-Tone—A service mark of the American Telephone and Telegraph Company that identifies its push-button (DMTF) dialing service. The signal form is multiple tones in the audio-frequency range.

	HIGH GROUP (Hz)			
	1209	1336	1477	1633
LOW GROUP (Hz)	697	1	ABC 2	DEF 3
	770	GHI 4	JKL 5	MNO 6
	852	PRS 7	TUV 8	WXY 9
	941	*	0	#

Touch-Tone frequencies.

Touch-Tone dialing—Push-button telephone dialing in which the direct-current pulsing technique of the rotating dial is replaced by a combination of tones to provide proper automatic switching.

Touch-Tone telephone set—Designation for a telephone set using a push-button multifrequency dial. Each digit consists of combining one lower frequency with one higher frequency, e.g., the digit 8 consists of combining 852 Hz and 1336 Hz.

touch voltage—The potential difference between a grounded metallic structure and a point on the earth's surface equal to the normal maximum horizontal reach (approximately 3 feet or 0.91 m).

tourmaline—A strongly piezoelectric natural or synthetic crystal.

tower—A structure usually used when an antenna must be mounted higher than 50 feet (15.24 m).

tower loading—The load placed on a tower by its own weight, the weight of the wires and insulators with or without ice covering, the wind pressure acting on both the tower and the wires, and the tension in the wires.

tower radiator—A metal tower structure used as a transmitting antenna.

Townsend criterion—The relationship expressing the minimum requirement for breakdown in terms of the ionization coefficients.

Townsend discharge—An electrical discharge in a gas at moderate pressure (above about 0.1 millimeter of mercury). It corresponds to corona, and is free from space charges.

Townsend ionization coefficient—The average number of ionizing collisions made by an electron as it drifts a unit distance in the direction of an applied electric force.

T-pad—A pad made up of resistance elements arranged in a T-network (two resistors inserted in one line, with a third between their junction and the other line).

TP tape—See triple-play tape.

tr— 1. Abbreviation for transient response. 2. Abbreviation for transmit-receive.

trace— 1. The pattern on the screen of a cathode-ray tube. 2. Software used for extremely detailed testing of the validity of an application program or other software. Data is stored in RAM as a program executes; when the program halts, a predetermined number of steps are available for examination.

traceability— 1. Symbol identification that permits symbols to be traced throughout a software system. Also, continuity between program versions. *See also* auditing. 2. The ability to track a manufactured item through the steps of its manufacture.

trace interval—The interval corresponding to the direction of sweep used for delineation.

trace line—The visible or recordable path traced on the screen of a CRT by a moving spot.

tracer— 1. A radioisotope that is mixed with a stable material to trace the material as it undergoes chemical and physical changes. 2. A thread of contrasting color woven into the insulation of a wire for identification purposes. 3. In automatic machine control, a sensing element that is made to follow the outline of a contoured template and produce the desired control signals. 4. *See* signal tracer.

trace routine—Special type of debugging routine that develops a sequential record of specified events in the execution of a program.

tracer program—Analysis tool that searches programs for unreachable (dead) code.

trace width—The distance between two points on opposite sides of a trace on an oscilloscope at which luminance is 50 percent of maximum. If the trace departs from a well-behaved (approximately Gaussian) form, it should be smoothed for the purpose of measurement.

tracing—The process of determining from what location in a telephone or computer network a call has originated.

tracing distortion—The nonlinear distortion introduced in the reproduction of a mechanical recording when the curve traced by the reproducing stylus is not an exact replica of the modulated groove.

tracing routine—*See* trace routine.

track— 1. A path that contains reproducible information left on a medium by recording means energized from a single channel. 2. In electronic computers, that portion of a moving-type storage medium accessible to a given reading station (e.g., film, drum, tapes, disks). *See also* band, 3; channel, 3. 3. To follow a point of radiation to obtain guidance. 4. The path on the magnetic tape along which a single channel of sound is recorded. 5. One of the ring-shaped sequence of sectors defined on the magnetic surface of a disk or drum. A floppy disk has 77 tracks, numbered from 0 to 76. Tracks are arranged concentrically. 6. The actual line of movement of an aircraft or a rocket over the surface of the earth; a projection of the history of the flight path on the surface. 7. The trace of a moving target on a plan-position-indicator radar screen or an equivalent plot. *See also* tracking.

trackability—How well the pickup system will track high amplitude and velocity modulation on a phonograph record at a given tracking weight.

trackball—A data-entry device consisting of a sphere mounted in a small open-topped box. This sphere is hand operated by rotating it about either its *x* or *y* axis. The rotation is translated into digital data and stored in special input registers. The registers are then read by the host computer. The most common use of a trackball is in the control of cursor and tracking-symbol movements. It can also be used wherever it is desired to continuously vary display or process parameters.

track-command guidance—A missile guidance method in which both target and missile are tracked by separate radars and commands are sent to the missile to correct its course.

track configuration—The number of separate recorded tracks that a machine can play or record. Thus, a two-track machine makes or plays two parallel tracks, each occupying slightly less than half the width of the tape. A four-track machine makes or plays four parallel tracks, two in the same playing direction on a two-channel machine, or four in the same playing direction on a quadrasonic machine. Monophonic machines can be full-track, half-track, or quarter-track.

track-hold memory—A circuit that, in its track mode, develops an output that follows (ideally) the input exactly, or is proportional to it; and then, in its hold mode, maintains the output constant (ideally) at the value it had at the instant the circuit was commanded to change from track to hold.

track homing—The process of following a line of position known to pass through an object.

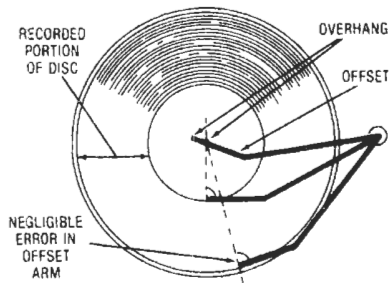
tracking— 1. The process of keeping a radio beam, or the cross hairs of an optical system, set on a target—usually while determining the range of the target. 2. The maintenance of proper frequency relationships in circuits designed to be simultaneously varied by ganged operations. 3. The accuracy with which the stylus of a phonograph pickup follows a prescribed path over the surface of the record. 4. The ability of a multigun tube to simultaneously superimpose information from each gun. Tracking error is the maximum allowable distance between the displays of any two guns. 5. The ability of an instrument to indicate at the division line being checked when energized by corresponding proportional values of actual end-scale excitation. 6. The interconnecting of power supplies in such a manner that one unit serves to control all units in series operation. In this manner, the output voltage of the slave units follows the variations of the master. 7. The difference at any shaft position between the output ratios of any two commonly actuated similar electrical elements expressed as a percentage of the single total voltage applied to them. 8. The process of following the movement of a satellite or rocket by radar, radio, and photographic observations. 9. The moving of a tracking symbol on the face of a CRT with a light-pen. The meaning can also be extended to include the movement of any graphical image on the screen, using any of the data entry devices. 10. The ability of a power supply to maintain a fixed ratio between multiple outputs regardless of variations in line, load, or ambient temperature. In supplies with symmetrical plus-and-minus outputs, tracking maintains equal amplitudes of opposite polarity, referred to the common terminal. 11. The accuracy of indication of an analog meter having a nonlinear scale.

tracking accuracy—The ability to indicate at a division line being checked when a meter is energized by corresponding proportional values of actual end-scale excitation, expressed as a percentage of actual end-scale value. Tracking accuracy is usually within one and one-half times the rated full-scale accuracy of the meter.

tracking antenna—A directional antenna system that automatically changes in position or characteristics to follow the motion of a moving signal source.

tracking error— 1. In lateral mechanical recording, the angle between the vibration axis of the mechanical system of the pickup and a plane that contains the tangent to the unmodulated record groove and is perpendicular to the recording surface at the point of needle contact. 2. In horizontal recording, the angle between the body of a phonograph cartridge and the tangent of a groove at the

point of a stylus contact. Ideally the angle should be zero, but can be maintained at less than 0.5° per inch (0.19° per centimeter) of playing radius in a well-designed tonearm. Excessive error can cause increased distortion on heavily recorded passages, especially near the inner grooves of the record.



Tracking error.

tracking filter—An electronic device that attenuates unwanted signals and passes the desired signal by the use of phase-lock techniques that reduce the effective bandwidth of the circuit and eliminate amplitude variations.

tracking force—The downward force applied to a stylus by means of an adjustment on the tonearm. Sometimes specified as a recommended range or a single force, in grams. It is usually advisable to track near the upper rather than the lower suggested value, since distortional record damage from mistracking at too low a force is more objectionable than the slightly increased wear from the higher force. A large stylus has a large groove contact area, and thus can tolerate a higher tracking force. *See also* stylus force.

tracking jitter—*See* jitter, 2.

tracking range—Also called lock-in range. The range of input frequency about f_0 under which a phase-locked loop, once locked, will remain locked. This is a function of loop gain, since the phase detector output is bounded and can drive the oscillator only over a certain frequency range. The tracking range may be controlled, if desired, by limiting the input signal to the oscillator.

tracking resistance—*See* arc resistance.

tracking spacing—The distance between the center line of adjacent tracks on a recording tape. In the typical case of longitudinal tracks 50 mils (1.27 mm) wide, the tracking spacing is 70 mils (1.78 mm).

tracking spot—A moving spot used for target indication on a radar.

tracking weight—The downward force of a pickup stylus that ensures optimum reproduction of recorded groove modulation with minimum wear of groove wall and stylus.

track-while scan—A radar system utilizing electronic-computer techniques whereby raw data is used to track an assigned target, compute target velocity, and predict its future position without interfering with the scanning rate.

track width—The width of the track on a recording tape, corresponding to a given record gap. The most common track widths encountered in longitudinal recording are 48 and 50 mils (1.22 and 1.27 mm), several such tracks being accommodated on a half-inch-wide (1.27 cm) tape.

TRACON—Abbreviation for Terminal Radar Approach Control. An air traffic control facility that is

responsible for areas designated as terminal control areas, the exact size of which differs depending on the facility, but typically extends to about 30 miles (48 kilometers) from the airport tower.

tractive force—The force that a permanent magnet exerts on a ferromagnetic object.

traffic—1. Messages handled by communication or amateur stations. 2. The messages sent and received over a communication channel.

traffic diagram—A chart or drawing that shows the movement and control of traffic over a communication system.

traffic distribution—The routing by which communications traffic passes through a terminal to a switchboard or dialing center.

traffic-flow security—Protection of the contents of messages by transmitting an uninterrupted flow of random text over a wire or radio link, with no indication that an interceptor may be used to determine which portions of this steady stream constitute encrypted messages and which portions are nearly random filler.

traffic forecast—Traffic level prediction on which communication system management decisions and engineering effort are based.

trailer—1. Tough, nonmagnetic tape spliced at the end of the recorded material on a tape that is expected to receive rough or frequent handling. Usually has one matte-finished surface for writing, and is often available in a variety of colors for coding purposes. *See also* leader.

trailer record—A record that follows one or more records and contains information related to those records.

trailers—Bright streaks at the right of large dark areas, or dark areas or streaks at the right of bright areas, in a televised picture. The usual cause is insufficient gain at low video frequencies.

trailing blacks—*See* following blacks.

trailing edge—The transition of a pulse that occurs last, such as the high-to-low transition of a high clock pulse.

trailing-edge pulse time—The time at which the instantaneous amplitude last reaches a stated fraction of the peak pulse amplitude.

trailing reversal—*See* following blacks; following whites.

trailing whites—*See* following whites.

train—A sequence of units of apparatus linked together to forward or complete a telephone call.

trainer—1. The representation of an operating system by computers and its associated equipment and personnel. 2. Electronic equipment used for training operators of radar or sonar apparatus by simulating signals received under operating conditions in the field.

train time—The period required for synchronous modems used on two- or four-wire leased lines to equalize the line and recover timing from the received data. This time, which applies primarily to full-duplex initialization, is especially important for multipoint operations. For either two- or four-wire circuits, actual transmission and reception cannot occur until both receiving and transmitting modems are synchronized. Train time is often referred to as RTS/CTS delay or poll response. It varies from 8.5 to about 40 ms. Faster modems use longer equalization times, and have longer train times.

tramlines—A pattern on an A-scope appearing as a number of horizontal lines above the baseline. The effect is produced by a continuous wave modulated with a low-frequency signal.

trans—Abbreviation for transmitter. Also abbreviated xmtr or xmtr.

transaction file—In a computer, a file containing information relating to current activities or transactions.

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 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 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

multiplied by an input magnitude will give a resulting output magnitude. 4. Relation between the illumination on a camera tube and the corresponding output-signal current, under specified conditions of illumination.

transfer charge—The net electric charge moved from one terminal of a capacitor to another through an external circuit.

transfer check—In a computer, verification of transmitted data by temporarily storing, retransmitting, and comparing. Also a check to see if the transfer or jump instruction was properly performed.

transfer circuit—A circuit that connects communication centers of two or more separate networks in order to transfer the traffic between the networks.

transfer constant—Also called the image-transfer constant. One-half the natural logarithm of the complex ratio of the voltage times current entering a transducer to that leaving the transducer when it is terminated in its image impedance.

transfer contact—*See* break-make contact.

transfer control—*See* jump.

transfer current—The starter-gap current required to cause conduction across the main gap of a glow-discharge cold-cathode tube.

transfer efficiency—The percentage of total charge that is transferred in a charge-coupled device from one position to another during readout.

transfer factor—Number relating the input and output currents of a transducer. *See* propagation constant, 2.

transfer function—1. A characterization of a system (for example, mechanical structure of filter) by determining how the system responds to input energy at different frequencies. It may be measured by one of three methods: (a) applying a single sine wave and measuring the response to that sine wave, then varying the frequency of the sine wave and noting the change in the system's response, (b) applying specially shaped random noise (many frequencies simultaneously) and observing the system response, or (c) applying an impulse (also containing a broad range of frequencies). The transfer function can be derived by dividing the cross-spectral density by the power spectral density of the input or driven signal. 2. A mathematical expression that describes the relationship between the values of a set of conditions at two different times, typically at the beginning and end of a process. 3. The mathematical expression that relates the output and input of any characteristics of a filter as a function of frequency. The function usually is complex and therefore usually contains components corresponding to both attenuation and phase. 4. The mathematical expression of the relationship between a simple scale factor, representing the effects of any linear transmitting or recording medium when a waveform is evaluated as frequency components, and the frequency.

transfer-function analyzer—An instrument that measures the amplitude and phase response of the output of a circuit relative to the input over a range of frequencies.

transfer impedance—Ratio of the potential difference applied at one pair of terminals of a network to the resultant current at another pair of terminals (all terminals being terminated in any specified manner).

transfer instruction—An instruction, signal, or operation that conditionally or unconditionally specifies the location of the next instruction and directs a computer to that instruction.

transfer loss—*See* coupling loss.

transfer operation—1. An operation that moves data from one storage location or one storage medium

transfer charge — transformer-coupled amplifier

to another. Transfer is sometimes taken to refer specifically to movement between different media; storage to movement within the same medium. 2. In a computer, transferring information from an accumulator to memory, or from memory to an accumulator; pushing into or popping out of the stack; or moving information to the program counter, stack pointer, etc.

transfer rate—The rate at which a transfer of data between the computer registers and storage, input, or output devices may be performed. It is usually expressed as a number of characters per second.

transfer ratio—From one point to another in a transducer at a specified frequency, the complex ratio of the generalized force or velocity at the second point to that applied at the first point.

transferred charge—The net electric charge moved from one terminal of a capacitor to another through an external circuit.

transferred charge characteristic—The mathematical function that relates transferred charge to capacitor voltage.

transfer switch—A form of air switch arranged so that a conductor connection can be transferred from one circuit to another without interrupting the current.

transfer time—1. The time required for a transfer to be made in a digital computer. 2. In a relay, the total time—after contact bounce has ceased—between the breaking of one set of contacts and the making of another.

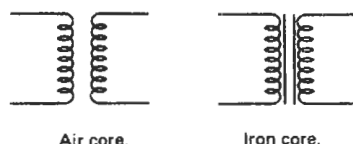
Transfluxor—A trade name (RCA) for a binary magnetic core having two or more openings. Control of the transfer of magnetic flux between the three or more legs of the magnetic circuits provides ways to store information, gate electrical signals, etc.

transform—1. To convert a current or voltage from one magnitude to another, or from one type to another. 2. In digital-computer programming, to change information in structure or composition without significantly altering the meaning or value. 3. To pass through a transformer. 4. To change data or equations from rectangular to polar coordinates, or vice versa.

transformation point—The temperature at which an alloy or metal changes from one crystal state to another as it heats or cools.

transformation ratio—The ratio between electrical output and input under certain specified conditions.

transformer—1. An electrical device that, by electromagnetic induction, transforms electric energy from one or more circuits to one or more other circuits at the same frequency, but usually at a different voltage and current value. 2. An electrical device that changes voltage in direct proportion to the ratio of the number of turns of its primary and secondary windings.



Air core.

Iron core.

Transformer.

transformer build—The amount of window area used in constructing a transformer.

transformer-coupled amplifier—An amplifier whose stages are coupled together by transformers.

transformer-coupled solid-state relay — A relay in which the control is applied to the primary of a low-power transformer, and the resulting secondary voltage triggers the thyristor switch to the load.

transformer coupling — Use of a transformer between stages of an amplifier, i.e., to connect the anode circuit of one stage to the grid circuit of the following stage.

transformerless receiver — A receiver in which the power-line voltage is applied directly to series-connected tube heaters or filaments and to a rectifier circuit instead of first being stepped up or down in voltage by a power transformer.

transformer load loss — Losses in a transformer that are incident to the carrying of the load. Load losses include I^2R loss in the windings due to load current, stray loss due to stray fluxes in the winding core, clamps, etc., and to circulating current, if any, in parallel windings.

transformer loss — Expressed in decibels, the ratio of the signal power that an ideal transformer of the same impedance ratio would deliver to the load impedance to the signal power delivered by the actual transformer.

transformer oil — A high-quality insulating oil in which windings of large power transformers are sometimes immersed to provide high dielectric strength, insulation resistance, and flash point, plus freedom from moisture and oxidation.

transformer read-only store — In computers, a type of read-only store in which the presence or absence of mutual inductance between two circuits is the condition that determines whether a binary 1 or 0 is stored.

transformer vault — An isolated enclosure, either above or below ground, with fire-resistant walls, ceiling, and floor for unattended transformers and their auxiliaries.

transformer voltage ratio — The ratio of the root-mean-square primary terminal voltage to the root-mean-square secondary terminal voltage under specified conditions of load.

transforming section — A length of waveguide or transmission line of modified cross section, or with a metallic or dielectric insert, used for impedance transformation.

transhybrid loss — 1. The transmission loss at a given frequency measured across a hybrid circuit when connected to a given two-wire termination and balancing network. 2. The loss (isolation) between the transmit and receive branches of a four-wire line. Transhybrid loss is directly dependent on the degree of balance between the two-wire line and its balancing network.

transient — 1. A phenomenon caused in a system by a sudden change in conditions, and which persists for a relatively short time after the change. 2. A distinct line or series of lines perpendicular to the direction of scanning produced in the recorded copy immediately following a sudden change in density. 3. A momentary surge on a signal or power line. It may produce false signals or triggering impulses and cause insulation or component breakdowns and failures. 4. Signal component of fast-rising leading side and usually of short duration. 5. A pulse, damped oscillation, or other temporary phenomenon occurring in a circuit or system. 6. Intermediate unstable state. 7. A change in a variable that disappears during transition from one steady-state operating condition to another. 8. Signals that exist for a brief period prior to the attainment of a steady-state condition. May include overshoots, damped sinusoidal waves, etc.

transient analyzer — An electronic device for repeatedly producing a succession of equal electric surges of small amplitude and of adjustable waveform in a test circuit and presenting this waveform on the screen of an oscilloscope.

transient behavior — In a power supply, the general attitude of response in terms of amplitude and time.

transient distortion — 1. Distortion due to the inability of a system to reproduce or amplify transients linearly. 2. Distortion of a transient signal component such as produced by resonance and lack of damping, the effect being overshoot or ringing following the fast-rising leading side of the signal component.

transient intermodulation distortion — Abbreviated TIM 1. Distortion that occurs in an amplifier having a large amount of negative feedback in its main feedback loop and a certain amount of time or phase delay between the input and output signals. If a very fast transient musical signal or pulse is fed to such amplifiers, the feedback needed to reduce the amplitude of that signal at the input (and later) stages arrives too late, and an overload or momentary clipping occurs. At the instant of such clipping, other program-signal elements are also distorted or even obliterated. 2. Intermodulation distortion that occurs only momentarily during brief transients or signal peaks.

transient magnistor — A high-speed saturable reactor in which an alternating electric current in the form of a sine-wave carrier or pulses is passed through a signal winding and modulated by variations of current passing through a control coil.

transient motion — Any motion that has not reached, or has ceased to be, a steady state.

transient oscillation — A momentary oscillation that occurs in a circuit during switching.

transient overshoot — The largest transient deviation of the measured quantity following the dynamic crossing of the final value as a result of the application of a specified stimulus.

transient peak-inverse voltage — Under specified conditions, the maximum allowable instantaneous value of nonrecurrent reverse (negative) voltage that may be applied to the anode of an SCR with the gate open.

transient phenomena — Rapidly changing actions occurring in a circuit during the interval between closing of a switch and settling to steady-state conditions, or any other temporary actions occurring after some change in a circuit or its constants.

transient recovery time — Also called recovery time, transient response time, or response time. 1. The interval between the time a transient deviated from a specified amplitude range and the time it returns and remains within the specified amplitude range. The amplitude range is centered about the average of the steady-state values that exist immediately before and after the transient. 2. The time required for the output voltage of a power supply to come back to within a level approximating the normal dc output following a sudden change in load current.

transient regulation — The degree of freedom of a system from variations in voltage and frequency caused by sudden changes, operational switching, emergency system faults, power transfers, etc.

transient response — 1. The transient of a dependent variable resulting from an abrupt change of an independent variable with all other variables constant. 2. Also called step-function response. Commonly, the characteristic response of a system to a unit sweep or unit impulse. The elements of transient response most commonly specified are rise time, fall time, overshoot, undershoot, preshoot, and ringing. 3. (Input line changes) The transient of an output variable (voltage, current, or power) of an electronic power supply resulting from an abrupt specified change of input line voltage, with all other conditions held constant. 4. (Load changes) The transient of an output variable (voltage, current, or power) of an

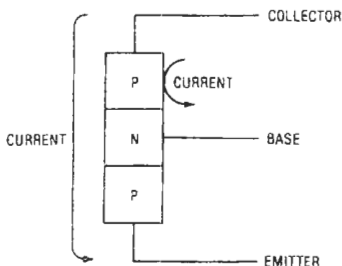
electronic power supply resulting from an abrupt specified change of load, with all conditions held constant. 5. Ability to respond to percussive signals cleanly and instantly. 6. The ability of an amplifier or transducer to handle and faithfully reproduce rapid changes in signal amplitudes. A very short rise time is a measure of this characteristic. 7. The closed-loop step function response of an amplifier under small-signal conditions. 8. The ability of an amplifier, microphone, or speaker to follow sudden changes in signal levels.

transient response time—See transient recovery time.

transient state—The condition in which a variable temporarily behaves in an erratic manner instead of changing smoothly and predictably.

transistance—1. The characteristic of an electrical element that makes possible the control of voltages, currents, or flux so as to produce gain or switching action in a circuit. Examples of the physical realization of transistance occur in transistors, diodes, and saturable reactors. 2. An electronic characteristic exhibited in the form of voltage or current gain or in the ability to control voltages or currents in a precise and nonlinear manner. (Examples of parts showing transistance: transistors, diodes, vacuum tubes.) 3. A function of transistors. An electrical property that causes applied voltage to create amplification or accomplish switching.

transistor—1. An active semiconductor device having three or more electrodes and capable of performing almost all the functions of tubes, including rectification and amplification. Germanium and silicon are the main materials used, with impurities introduced to determine the conductivity type (n-type has an excess of free electrons; p-type, a deficiency). Conduction is by means of electrons (elementary particles having the smallest negative electrical charge that can exist) and holes (mobile electron vacancies equivalent to a positive charge). 2. A tiny chip of crystalline material, usually silicon, that amplifies or switches electric current. It is a three-terminal semiconductor device. A small current (base current) applied to one terminal can control a larger current (collector current) between the other two terminals. For elementary purposes, a transistor can be looked at as a resistor whose value can be changed from a high to a low value by applying a current to the base lead. 3. A three-terminal active semiconductor device that provides current amplification. A bipolar transistor is comprised of base, emitter, and collector and is a current-controlled device with a low input impedance. A field-effect transistor has gate, source, and drain electrodes and is a high-impedance, voltage-controlled device. The first transistor was invented at Bell Laboratories in 1947 by Nobel-Prize physicists John Bardeen, William Shockley, and Walter Brattain.



Transistor (typical).

transistor action—The physical mechanism of amplification in a junction transistor.

transistor amplifier—An amplifier in which the required amplification is produced by one or more transistors.

transistor base—The region between an emitter and a collector of a transistor, into which minority carriers are injected.

transistor chip—An unencapsulated transistor element of very small size used in microcircuits.

transistor dissipation—The power dissipated in the form of heat by the collector. The difference between the power supplied to the collector and the power delivered by the transistor to the load.

transistorized—Pertaining to equipment or a design in which transistors instead of vacuum tubes are used.

transistor oscillator—An oscillator that uses a transistor in place of an electron tube.

transistor-outline metal-can package—Abbreviated TO can. A type of package that resembles a transistor can, but generally is larger and has more leads. The pins are arranged in a circular pattern in the base. This type of package is often used for MSI, LSI, and MOS ICs.

transistor parameters—The performance characteristics of a transistor or class of transistors.

transistor pentode—A transistor designed for mixing, modulating, or switching and containing the equivalent of three emitters, a base, and a collector.

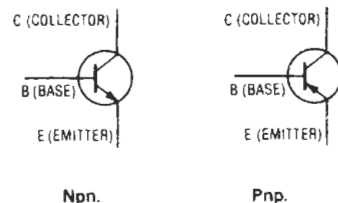
transistor radio—A radio receiver that uses transistors in place of electron tubes.

transistor region—The region around a pn junction in which the majority carriers from each side of the junction diffuse across it to recombine with their respective counterparts.

transistor-resistor logic—Abbreviated TRL. An early form of logic-circuit design that was employed prior to the advent of monolithic circuits. The input elements are resistors; however, unlike RTL there is only one active output transistor. In discrete circuit designs, this logic form was the least expensive since it required a minimum number (one) of active devices.

transistor seconds—Also called fallouts. Those transistors that remain after the firsts (units meeting rigid specifications for a specific application) have been removed from the production line.

transistor symbols—Symbols used to represent transistors on schematic diagrams.



Transistor symbols.

transistor testers—Equipment and instruments that detect or measure leakage current, breakdown voltage, gain, or saturation voltage. Some testers are computer operated.

transistor-transistor logic—Abbreviated TTL or T²L. Also called multiemitter transistor logic. 1. A logic-circuit design similar to DTL, with the diode inputs

replaced by a multiple-emitter transistor. In a four-input DTL gate, there are four diodes at the input. A four-input TTL gate will have four emitters of a single transistor as the input element. TTL gates using npn transistors are positive-level NAND gates or negative-level NOR gates. 2. A relatively high-speed and inexpensive bipolar logic circuit most commonly used in today's logic designs. 3. Any logic gate circuit that uses a multiemitter npn transistor to perform the positive AND function, followed by one or more transistors to add power to (and possibly invert) the output. Operating speed is generally faster than that of DTL. 4. A widely used form of semiconductor logic. Its basic logic element is a multiple-emitter transistor. TTL is characterized by fairly high speed and medium power dissipation.

transit angle—The product of angular frequency and the time taken for an electron to cross a given path.

transition—1. The process in which a quantum-mechanical system makes a change between energy levels. During this process, energy is either emitted or absorbed, usually in the form of photons, phonons, or kinetic energy of particles. Transitions that involve photons alone are called direct radiative transitions, whereas those that require a combination of a photon and a phonon are called indirect transitions. 2. The instance of changing from one state (such as a positive voltage) to a second state (such as a negative voltage) in a serial transmission.

transitional function—A transfer function that represents a compromise made between the classical types of functions (Tchebychev, Butterworth, Gaussian, etc.) as a result of the fact that each classical function has certain advantages and disadvantages. In general, however, better functions than the transitional functions are available if the transfer function is optimized with respect to its own particular requirement.

transition band—The range of frequencies that bound a passband/stopband interface.

transition card—A card that signals the computer that the reading-in of a program has ended and that the carrying out of the program has started.

transition counts—A particular digital signature used in logic-board testing.

transition element—An element used for coupling different types of transmission systems, e.g., for coupling a coaxial line to a waveguide.

transition error—In an encoder, the difference between the shaft angle at which a code-position change should occur and the angle at which it actually does occur.

transition factor—See reflection factor, 1.

transition frequency—Also called crossover frequency. 1. In a disc-recording system, the frequency corresponding to the point of intersection of the asymptotes to the constant-amplitude and the constant-velocity portions of its frequency-response curve. This curve is plotted with output-voltage ratio in decibels as the ordinate, and the logarithm of the frequency as the abscissa. 2. In a transistor, the product of the magnitude of the small-signal, common-emitter, forward-current transfer ratio times the frequency of measurement when this frequency is high enough that the magnitude is decreasing with a slope of approximately 6 dB per octave.

transition layer—See transition region, 1.

transition-layer capacitance—See depletion-layer capacitance.

transition loss—At any point in a transmission system, the ratio of the available power from that part of the system ahead of the point under consideration to the power delivered to that part of the system beyond the point under consideration.

transition oscillator—A negative-transconductance oscillator employing a pentode tube with a capacitor connected between the screen and suppressor grids. The suppressor grid periodically divides the current between the screen grid and anode, thereby producing oscillations.

transition point—A point at which the circuit constants change in such a way that a wave being propagated along the circuit is reflected.

transition region—1. Also called transition layer. The region, between two homogeneous semiconductor regions, in which the impurity concentration changes. 2. The area, between the passband and the stopband, in which the attenuation of a filter is neither great nor small. The narrower the transition region, the more difficult is the design of the filter. 3. The region around a pn junction in which the majority carriers of each side diffuse across the junction to recombine with their respective counterparts.

transition temperature—The temperature below which the electrical resistance of a material becomes too small to be measured.

transition time—The time required for a voltage change from one logic level to the opposite level, as measured between specified points on the transition waveform. The transition times from high to low level and from low to high level generally are different.

transitron—A thermionic tube circuit whose action depends on the negative transconductance of the suppressor grid of a pentode with respect to the screen grid.

transit time—1. The time taken for a charge carrier to cross a given path. 2. The average time a minority carrier takes to diffuse from emitter to collector in a junction transistor. 3. The time an electron takes to cross the distance between the cathode and anode.

transit-time mode—A condition of oscillator operation, corresponding to a limited range of drift-space transit angle, for which the electron stream introduces a negative conductance into the coupled circuit.

translate—1. To change computer information from one language to another without significantly affecting the meaning. 2. To change one binary word to another, or to change to a different pair of binary signal levels, for the purpose of achieving compatibility between parts of a system. 3. To transform information in a way that preserves meaning, i.e., from one code to another or from one language to another.

translation—The conversion of a message to a different set of symbols. For example, in instrumentation, the changing of conventional algebraic expressions into machine language for computer programming.

translational morphology—The structural characterization of an electronic component in which it is possible to identify the areas of patterns of resistive, conductive, dielectric, and active materials in or on the surface of the structure with specific corresponding devices assembled to perform an equivalent function.

translation frequency—The 2220-MHz (2.2-GHz) frequency difference between an uplink and a downlink signal of a satellite TV system.

translation loss—Also called playback loss. The loss in the reproduction of a mechanical recording, whereby the amplitude of motion of the reproducing stylus differs from the recorded amplitude in the medium.

translator—1. A device that transforms signals from the form in which they were generated into a useful form for the purpose at hand. 2. A television receiver and low-power transmitter that receives television signals on one channel and retransmits them on another channel (usually a UHF channel) to valleys and like areas that cannot receive the direct signals. 3. In telephone equipment, the device that converts dialed digits into call-routing information. 4. In electric computers, a network or system

that has a number of inputs and outputs and is connected so that input signals representing information expressed in a certain code result in output signals that represent the input information in a different code. 5. A generic term for any system that converts one language into another.

translator package—A computer program that allows a user program (in binary) to be converted into a usable form for computer manipulation. *See also* program assembly.

transliterate—To change the characters of one alphabet to the corresponding characters of another alphabet.

translucent—Partially transparent. In optics the notion of imperfect, or diffused, light transmission is generally implied. Thus, a translucent material may conduct light but not clear images.

transmissibility—Ratio of the response amplitude of the system in steady-state forced vibration to the excitation amplitude. The ratio may be between forces, displacements, velocities, or accelerations.

transmission—1. Conveying electrical energy from point to point along a path. 2. The transfer of a signal, message, or other form of intelligence from one place to another by electrical means. 3. The dispatching of a signal, message, or other form of intelligence by wire, radio, telegraphy, telephony, facsimile, or other means; the signaling of data over communications channels. 4. A series of characters, messages, or blocks, including control information and user data, sent over a communication channel.

transmission anomaly—The difference, in decibels, between the total loss in intensity and the reduction in intensity that would be due to an inverse-square divergence.

transmission band—The range of frequencies above the cutoff frequency of a waveguide, or the comparable useful frequency range for any other type of transmission device.

transmission cable—1. Two or more transmission lines. If the structure is flat, it is sometimes called flat transmission cable to differentiate it from a round structure, such as a jacketed group of coaxial cables. *See* transmission line. 2. A signal-carrying circuit composed of conductors and dielectric material with controlled electrical characteristics, used for the transmission of high-frequency or narrow-pulse type signals.

transmission coefficient—For a transition or discontinuity between two transmission media at a given frequency, the ratio of some quantity associated with the transmitted wave at a specified point in the second medium to the same quantity associated with the incident wave at a specified point in the first medium.

transmission facility—1. The transmission medium and all the associated equipment required to transmit a message. 2. Cable and/or radio facility constituting inter-switch trunks and subscriber access lines.

transmission factor—Ratio of flux transmitted to flux incident. Inverse of opacity.

transmission function—The ratio of the output voltage to the input voltage of a filter expressed in terms of magnitude and phase (or delay).

transmission gain—1. *See* gain. 2. The increase in the power of an electrical signal from one point in the circuit to another.

transmission gate—The solid-state equivalent of a relay, having terminals that are connected to each other or not depending on the application of a separate control voltage. (In CMOS logic it is bidirectional.)

transmission level—The level of signal power at any point in a transmission system. It is equal to the ratio of the power at that point to the power at some point

translator package — transmission security

in the system chosen as a reference point. This ratio is usually expressed in decibels.

transmission line—1. A material structure forming a continuous path from one place to another, and used for directing the transmission of electromagnetic energy along this path. 2. A conductor or series of conductors used for conveying electrical energy from a source to a load. 3. One or more insulated conductors arranged to transmit electrical energy signals from one locality to another. 4. A signal-carrying circuit with controlled electrical characteristics used to transmit high-frequency or narrow-pulse signals.

transmission-line coupler—A coupler that allows the passage of electric energy in either direction between balanced and unbalanced transmission lines.

transmission-line loss—1. The difference in the amount of energy delivered at the output of a transmitter and the amount of energy absorbed by the antenna. For example, if a transmitter delivers 3 watts and the transmission line (coaxial cable) loss is 1 dB, the antenna will absorb approximately 2.4 watts since 20 percent of the available power is lost in the transmission line. 2. The power lost when a radio signal is fed from the antenna to the receiver through coaxial cable; expressed in decibels.

transmission-line-tuned frequency meter—A frequency meter using a tuned length of wire or a coaxial cavity as the frequency-determining element.

transmission link—The path over which information flows from sender to receiver.

transmission loss—The decrease or loss in power during transmission of energy from one point to another. Usually expressed in decibels.

transmission measuring set—A measuring instrument comprising a signal source and a signal receiver having known impedances, for measuring the insertion loss or gain of a network or transmission path connected between those impedances.

transmission mode—A form of waveguide propagation along a transmission line characterized by the presence of transverse magnetic or transverse electromagnetic waves. Waveguide transmission modes are designated by integers (modal numbers) associated with the orthogonal functions used to describe the waveform. These integers are known as waveguide-mode subscripts. They may be assigned from observations of the transverse field components of the wave and without reference to mathematics.

transmission modes—Simplex transmission goes only one way; simplex with back-channel, one way with limited talk-back handshaking. Half-duplex transmission is bidirectional but in one direction at a time; full-duplex is simultaneously bidirectional.

transmission modulation—Amplitude modulation of the current in the reading beam of a charge-storage tube as the beam passes through apertures in the storage surface. The degree of modulation depends on the stored charge pattern.

transmission primaries—The set of three primaries, either physical or nonphysical, each chosen to correspond in amount to one of the three independent signals contained in the color-picture signal. The I, Q, and Y signals.

transmission regulator—A device that maintains the transmission substantially constant over a system.

transmission response—The conversion of electrical energy traveling at the speed of light to sonic energy traveling at the speed of sound.

transmission security—That part of communications security resulting from all measures intended for protection of transmissions from unauthorized interception, traffic analysis, and imitative deception.

transmission selective—The transmission of electromagnetic energy at wavelengths other than those that are reflected or absorbed.

transmission speed—The number of information elements sent per unit time, usually expressed as bits, characters, word groups, or records per second or per minute.

transmission system—1. An assembly of elements capable of functioning together to transmit signal waves. 2. One of two broad groups of communication means, distinguished by their information-carrying bandwidth and referred to as either wideband or narrow-band transmission systems. The wideband system includes tropospheric scatter radio relay and submarine cables, and has an information bandwidth of more than four voice-frequency (3 to 4 kHz bandwidth) channels. The narrow-band system includes high-frequency radio (single sideband, amplitude modulated, ionospheric scatter) and landlines, and has an information-carrying bandwidth of four voice channels or less.

transmission time—The absolute time interval between transmission and reception of a signal.

transmission-type frequency meter—A frequency meter in which a tuned electrical circuit or a cavity is used to transmit the energy from the signal source under test to a detecting load.

transmission wavemeter—A device that makes use of a cavity to transmit maximum power at resonance so that maximum deflection is obtained on a readout meter at the frequency of resonance.

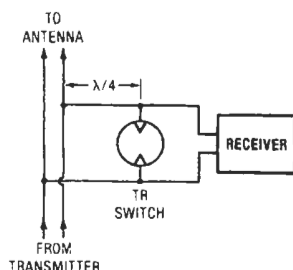
transmit—To send a program, message, or other information from one location to another.

transmit current—The current drawn by a transmitter when in the transmit mode.

transmit-on-alarm—A security device that activates only when triggered. Most security devices are of this nature; however, in multiplexing systems, it is usually impossible to determine whether or not transmit-on-alarm devices are actuated or whether the transmitter has failed or the communication channel is inoperative.

transmit-on-interrogation—The response of a security device that stores an alarm until it is interrogated in an appropriate manner. Used in multiplexed systems to avoid the problem of two simultaneous transmissions of alarm by two or more different stations.

transmit-receive switch—Also called a tr switch, tr box, tr tube, or duplexing assembly. An automatic device employed in a radar to prevent the transmitted energy from reaching the receiver, but allowing the received energy to do so without appreciable loss.



Transmit-receive switch.

transmit-receive tube—See tr tube.

transmittal mode—The method by which the contents of an input buffer are made available to the

program and the method by which records are made available by a program for output.

transmittance—1. Of a material, the ratio of the radiant power transmitted through the material to the incident radiant power. 2. As a transfer function, a response function for which the variables are measured at different ports (terminal pairs).

transmitted-carrier operation—Amplitude-modulated carrier transmission in which the carrier wave is transmitted.

transmitted wave—See refracted wave.

transmitter—1. Equipment used to generate and amplify an rf carrier signal, modulate this carrier with intelligence, and radiate the modulated rf carrier into space. 2. In telephony, the microphone that converts sound waves into electrical signals at an audio-frequency rate. 3. Apparatus for converting electrical energy received from a source into radio-frequency electromagnetic energy capable of being radiated. 4. The device in a telephone handset used to convert speech to electrical energy. 5. A device that translates the low-level output of a sensor or transducer to a higher-level signal suitable for transmission to a site where it can be further processed.

transmitter distributor—In teletypewriter operations, a motor-driven device that translates teletypewriter code combinations from perforated tape into electrical impulses and transmits these impulses to one or more receiving stations.

transmitter frequency tolerance—The extent to which the carrier frequency of a transmitter may legally depart from the assigned frequency.

transmitter start code—Usually a two-letter call that is sent to an outlying machine to automatically turn on its tape transmitter.

transmitting antenna—A device for converting electrical energy into electromagnetic radiation capable of being propagated through space.

transmitting current response—Of an electroacoustic transducer used for sound emission, the ratio of the sound pressure apparent at a distance of 1 meter in a specified direction from the effective acoustic center of the transducer to the current flowing at the electric input terminals. Usually expressed in decibels above a reference-current response of 1 microbar per ampere.

transmitting efficiency (projector efficiency)—Ratio of the total acoustic power output of an electroacoustic transducer to the electric power input.

transmitting element—In fiber optics, the light-radiating side of the terminus in an optical conductor.

transmitting loop loss—That part of the repetition equivalent assignable to the station set, subscriber line, and battery supply circuit that are on the transmitting end.

transmitting power response (projector power response)—Of an electroacoustic transducer used for sound emission, the ratio of the effective sound pressure apparent at a distance of 1 meter in a specified direction from the effective acoustic center of the transducer to the electric power input. Usually expressed in decibels above a reference response of 1 microbar square per watt of electric input.

transmitting station—A location at which the transmitter of a radio system and its antenna and associated equipment are grouped.

transmitting voltage response—Of an electroacoustic transducer used for sound emission, the ratio of the sound pressure apparent at a distance of 1 meter in a specified direction from the effective acoustic center of the transducer to the signal voltage applied at the electric input terminals. Usually expressed in decibels above a reference-voltage response of one microbar per volt.

transolver—A servo unit with a three-phase stator and a two-phase rotor that can be used either as a control transmitter (with one rotor phase excited and the other shorted) or as a control transformer with the signal obtained from one phase of the rotor, making sure the other phase is equally loaded to prevent unbalances.

transonic speed—A speed of 600 to 900 miles per hour (965 to 1448 km/h), corresponding to about Mach 0.8 to 1.2.

transparent—1. Implying clear and unimpeded transit of light. Window glass is a common example. 2. A computer process or function that is invisible to the user.

transparent computer voice—Digitized and reconstructed voice that 80 percent of uncued listeners would not recognize as having come from a computer.

transparent device—A device on a communications network that functions without making its presence known to the end terminals.

transponder—1. A combination receiver, frequency converter, and transmitter package designed to receive a signal and to retransmit it on another frequency. Broadcast and telecommunication satellites are equipped with transponders, which have a typical output of 5 to 10 watts and operate over a frequency band with a 36 to 72 megahertz bandwidth in the L, C, Ku, and sometimes Ka bands. Communication satellites typically have between 12 and 24 onboard transponders, although the INTELSAT VI has 50. 2. A component designed to receive a signal and to retransmit it on another frequency. 3. A radio transmitter-receiver that transmits identifiable signals automatically when the proper interrogation is received. *See also* pulse repeater. 4. A device (usually in the form of a radio transmitter) which sends a confirming or identifying message or releases a stored message after being triggered by an interrogator. Used on communication satellites. 5. A microwave repeater that receives, amplifies, downconverts, and retransmits signals from a communication satellite.

transponder dead time—The time interval between the start of a pulse and the earliest instant at which a new pulse can be received or produced by a transponder.

transponder efficiency—A ratio expressed as a percentage of the number of replies to the number of interrogations from a transponder.

transponder suppressed time delay—The overall fixed delay between reception of an interrogation and the transmission of a reply.

transport—Also called tape transport. 1. Platform or deck of a tape recorder on which the motor (or motors), reels, heads and controls are mounted. It includes those parts of the recorder other than the amplifier, preamplifier, speaker, and case. 2. That portion of a tape recorder which holds the reels of magnetic tape and draws the tape at a constant speed past the recording and playback heads.

transportable transmitter—Sometimes called a portable transmitter. A transmitter designed to be readily carried from place to place, but normally not operated while in motion.

transport time—In an automatic system, the time required to move an object, element, or information between two predetermined positions.

transposition—The interchanging of the relative positions of the conductors in an open-wire line to reduce noise, interference, and crosstalk.

transposition blocks—Spreaders used to space and reverse the relative positions of two conductors at fixed intervals.

transposition section—A length of open-wire line to which a fundamental transposition design or pattern is applied as a unit.

transradar—A bandwidth-compression system for use in long-range narrow-band transmission of radio signals from a radar receiver to a remote location.

transrectification—The rectification that occurs in one circuit when an alternating voltage is applied to another circuit.

transrectification characteristic—The graph obtained by plotting the direct voltage values for one electrode of a vacuum tube as abscissas against the average current values in the circuit of that electrode as ordinates, for various values of alternating voltage applied to another electrode as a parameter. The alternating voltage is held constant for each curve, and the voltages on other electrodes are maintained constant.

transrectification factor—The change in average current of an electrode, divided by the change in the amplitude of the alternating sinusoidal voltage applied to another electrode (the direct voltages of this and other electrodes being maintained constant).

transrectifier—A device, ordinarily a vacuum tube, in which rectification occurs in one electrode circuit when an alternating voltage is applied to another electrode.

transresistance amplifier—An amplifier that supplies an output voltage proportional to an input current. The transfer function of the amplifier is $e_o/i_{in} = R_m$, where R_m is the transresistance.

transverse-beam traveling-wave tube—A traveling-wave tube in which the electron beam intersects the signal wave rather than moving in the same direction.

transverse crosstalk coupling—Between a disturbing and a disturbed circuit in any given section, the vector summation of the direct couplings between adjacent short lengths of the two circuits, without dependence on intermediate flow in nearby circuits.

transverse electric wave—Abbreviated TE wave. In a homogeneous isotropic medium, an electromagnetic wave in which the electric field vector is everywhere perpendicular to the direction of propagation. The dominant mode in a rectangular waveguide is TE_{10} .

transverse electromagnetic wave—Abbreviated TEM wave. In a homogeneous isotropic medium, an electromagnetic wave in which the electric and magnetic field vectors both are everywhere perpendicular to the direction of propagation. This is the normal mode of propagation in coaxial line, open-wire line, and stripline.

transverse-field traveling-wave tube—A traveling-wave tube in which the traveling electric fields that interact with the electrons are essentially transverse to the average motion of the electrons.

transverse interference—Interference occurring across terminals or between signal leads.

transverse magnetic E-mode—A type of mode in which the longitudinal component of the magnetic field is zero and the longitudinal component of the electric field is not zero.

transverse magnetic wave—Abbreviated TM wave. In a homogeneous isotropic medium, an electromagnetic wave in which the magnetic field vector is everywhere perpendicular to the direction of propagation.

transverse magnetization—Magnetization of a recording medium in a direction perpendicular to the line of travel and parallel to the greater cross-sectional dimension.

transverse recording—The technique of rotating heads that are oriented perpendicular to the edge and surface of the tape.

transverse wave—A wave in which the direction of displacement is perpendicular to the direction of propagation at each point of the medium. When the direction of displacement forms an acute angle with the

direction of propagation, the wave is considered to have both a longitudinal and a transverse component.

trap—1. A selective circuit that attenuates undesired signals but does not affect the desired ones. *See also* wave trap. 2. A crystal imperfection that can trap carriers. 3. An unprogrammed conditional jump to a known location, the jump being activated automatically by hardware; the location from which the jump occurs is recorded. 4. A device, usually a switch, installed within a protected area, which serves as secondary protection in the event a perimeter alarm system is successfully penetrated. Examples are a trip-wire switch placed across a likely path for an intruder, a mat switch hidden under a rug, or a magnetic switch mounted on an inner door. 5. A volumetric sensor installed so as to detect an intruder in a likely traveled corridor or pathway within a security area. 6. A CPU-initiated interrupt that is automatically generated when a predetermined condition, such as an illegal instruction, a breakpoint, a specified error, or power failure, is detected. Two vector locations are dedicated for each trap type. The vector locations contain the pc and ps for the trap service routine. 7. A method of catching computer program error when illegal instructions are executed or illegal memory locations are accessed. 8. A frequency-sensitive device that is used to attenuate specific signals that cause interference.

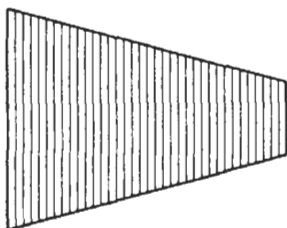
TRAPATT diode—Abbreviation for trapped plasma avalanche transit time diode. 1. A microwave avalanche diode that has either an n+pp+ or a p+nn+ structure. It may be manufactured from either silicon or germanium. When the diode is biased into breakdown, an electron-hole plasma fills the entire p or n region, and the voltage across the diode drops. A large current, induced by the low residual electric field, extracts the plasma from the diode. After the plasma is removed, the current drops and voltage rises. Energy stored in the resonant circuits of an oscillator raises the voltage above breakdown, and the cycle repeats. 2. A semiconductor microwave diode that, when its junction is biased into avalanche, exhibits a negative resistance at frequencies below the transit-time frequency range of the diode due to generation and dissipation of trapped electron-hole plasma resulting from the intimate interaction between the diode and a multiresonant microwave cavity.

TRAPATT oscillator—*See* trapped avalanche triggered transit (TRAPATT) oscillator.

trapezoidal distortion—Distortion in which a televised picture has the shape of a trapezoid (wide at top or bottom) instead of a rectangle. It is due to the interaction between the vertical- and horizontal-deflection coils (or plates) of the cathode-ray tube.

trapezoidal generator—An electronic circuit that produces a trapezoidal voltage wave.

trapezoidal pattern—An oscilloscope pattern that indicates the percentage of modulation in an amplitude-modulated system.



Trapezoidal pattern.

trapezoidal wave—1. A trapezoidal-shaped waveform. 2. A square wave onto which a sawtooth has been superimposed. It is a voltage wave necessary to give a linear deflection current through the coils of a magnetically deflected cathode-ray tube.

trapped avalanche triggered transit (TRAPATT) oscillator—Oscillator device composed of a semiconducting diode in a coaxial resonating cavity. When the biasing current is applied to the diode, high-frequency waves are emitted into the cavity, where they are reflected back and forth and eventually produce a radio-frequency output.

trapped flux—In a material in the superconducting state, magnetic flux linked with a closed superconducting loop.

trapped plasma avalanche transit time diode—*See* TRAPATT diode.

trapping—1. The holding of electrons or holes by any of several mechanisms in a crystal, thereby preventing them from moving. 2. In a computer, instructions that cause initiation by the central processing unit of an internal interrupt that transfers control to a subroutine which activates the desired operation of the instruction. Also, the subroutine can be changed, thereby causing the operation on the instruction to be changed.

trap wire—A low-voltage wire used at hinge points where severe flexing occurs, usually in burglar alarm systems. It is made with tinsel conductor.

traveling detector—A probe mounted on a slider and free to move along a longitudinal slot cut into a waveguide or coaxial transmission line. The traveling detector is connected to auxiliary measuring apparatus and used for examining the relative magnitude of any standing-wave system.

traveling plane wave—A plane wave in which each frequency component has an exponential variation of amplitude and a linear variation of phase in the direction of propagation.

traveling wave—The resulting wave when the electric variation in a circuit takes the form of translation of energy along a conductor, such energy being always equally divided between current and potential forms.

traveling-wave amplifiers—A two-port amplifier in which the input signal excites a space-charge wave at one end of a slab of negative-differential-resistivity bulk material. The wave travels through the material between ohmic contacts that serve as a transmission line. The charge builds as it moves, so the output is a larger version of the input.

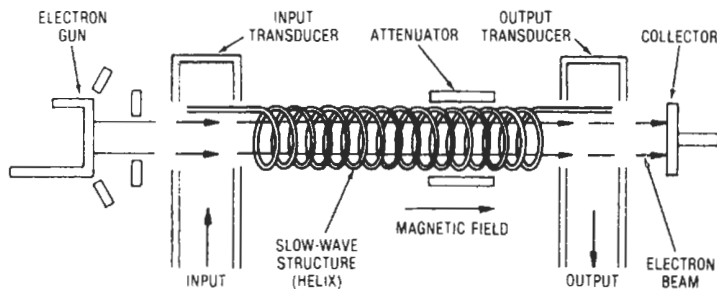
traveling-wave magnetron—A traveling-wave tube in which the electrons move in crossed static electric and magnetic fields that are substantially normal to the direction of wave propagation.

traveling-wave magnetron oscillations—Oscillations sustained by the interaction between the space-charge cloud of a magnetron and a traveling electromagnetic field with approximately the same phase velocity as the mean velocity of the cloud.

traveling-wave parametric amplifier—A parametric amplifier that has a continuous iterated structure incorporating nonlinear reactors and in which the signal, pump, and difference-frequency waves are propagated along the structure.

traveling-wave phototube—A traveling-wave tube that has a photocathode and a window that admits a modulated laser beam, which causes the emission of a current-modulated photoelectron beam. This beam is then accelerated by an electron gun and directed into the helical slow-wave structure of the tube.

traveling-wave tube—Abbreviated TWT. A tube in which a stream of electrons interacts continuously or



Traveling-wave tube.

repeatedly with a guided electromagnetic wave moving substantially in synchronism with it, and in such a way that there is a net transfer of energy from the stream to the wave.

traveling-wave-tube amplifier—A power-amplifying piece of equipment yielding about 30 dB of gain over broad bandwidths. The units are built around certain TWTs in the most commonly used frequency bands, and they have external modulation circuitry incorporated.

traveling-wave-tube interaction circuit—An extended electrode arrangement used in a traveling-wave tube to propagate an electromagnetic wave in such a manner that the traveling electromagnetic fields are retarded to the point at which they extend into the space occupied by the electron stream.

tr box—See transmit-receive switch.

tr cavity—The resonant portion of a tr switch.

treble—1. The higher part in harmonic music or voice; of high or acute pitch. In music, the frequencies from middle C (261.63 hertz) upward. 2. The upper range of audio frequencies.

treble boost—Deliberate adjustment of the amplitude-frequency response of a system or component to accentuate the higher audio frequencies.

tree—A set of connected branches without meshes.

treeing—A progressive type of insulation failure in which branching hollow channels slowly penetrate the insulation at rather low applied voltages.

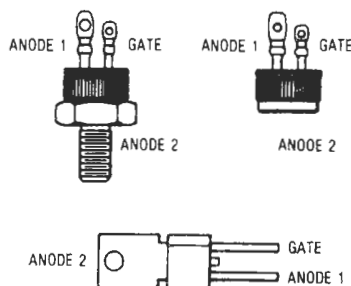
tree network—See hierarchical network.

tremolo—1. The amplitude modulation of an audio tone, widely used in musical-instrument amplifiers to create effects that add to the capability of the instrument itself. It is a musical effect characterized by a subaudio modulation of the musical tone. When amplitude modulation is used, it is called tremolo; a frequency modulation effect is termed vibrato. 2. A warbling or fluctuating effect, approximately seven times per second, in the tone of an instrument characterized by a variation in intensity rather than pitch. See also vibrato. 3. A regular variation in the amplitude of a sound, generally at a frequency between 0.5 and 20 Hz.

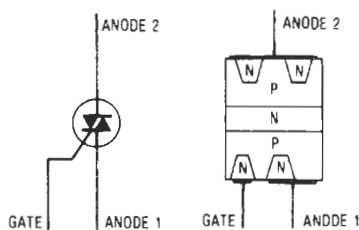
TRF—Abbreviation for tuned radio frequency.

tri—Abbreviation for triode.

triac—Also called bidirectional triode thyristor. 1. A bidirectional rectifier (essentially two SCRs in parallel) that functions as an electrically controlled switch for ac loads and having an npnp structure that can be triggered into either forward or reverse conduction by a pulse applied to its gate electrode. A triac will pass an alternating current. 2. A thyristor that can be triggered into conduction in either direction. Terminals are called main terminal 1 and gate. 3. A semiconductor device that functions as an electrically controlled switch for ac loads. The triac is one type of thyristor.

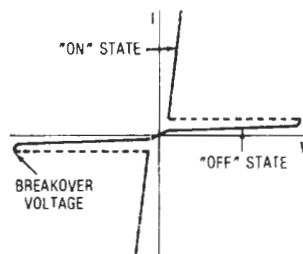


Construction and connections.



Symbol.

Junctions.



Characteristic

Triac.

triad—1. Three radio stations operated as a group for determining the position of aircraft or ships. 2. A group of three dots, one of each color-emitting phosphor, on the screen of a color picture tube. 3. A group of three bits or three pulses, usually in sequence on one wire or simultaneously on three wires. 4. Also called a triplex. A group of three insulated conductors twisted together without (or with) a sheath overall. Usually color-coded

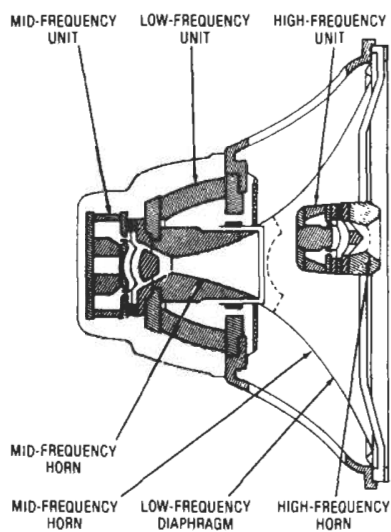
for identification. 5. In a color CRT, one set of red, green, and blue phosphors.

triangulation—A method of finding the location of a third point by taking bearings from two fixed points a known distance apart. The third point will be at the intersection of the two bearing lines.

triax—A type of shielded conductor that employs a shield and jacket over the primary insulation, plus a second shield and jacket over all. Aside from applications requiring maximum attenuation of radiated signals or minimum pickup of external interference, this cable can also be used to carry two separate signals.

triaxial cable—1. A special form of coaxial cable containing three conductors. 2. A three-conductor cable with one conductor in the center, a second circular conductor shield concentric with the first, and a third circular conductor shield insulated from and concentric with the first and second, and a braid or impervious sheath overall.

Triaxial® speaker—Trade name applied to the three-way speakers manufactured by Jensen Sound Laboratories, Division of Pemcor, Inc., consisting of three electrically independent speaker elements mounted on a common (single) speaker frame.



Triaxial speaker.

tribo-—A prefix meaning due to or pertaining to friction.

triboelectric—Pertaining to electricity generated by friction.

triboelectricity—Electrostatic charges generated due to friction between different materials.

triboelectric series—A list of substances arranged so that any of them can become positively electrified when rubbed with one farther down the list, or negatively charged when rubbed with one farther up the list.

triboluminescence—Luminescence that arises from friction. Usually occurs in crystalline materials.

tributary circuit—A circuit that connects an individual drop, or drops, to a switching center.

tributary station—A communications terminal consisting of equipment compatible for the introduction of messages into, or reception from, its associated relay station.

Triboelectric Series

Positive

Asbestos
Rabbit fur
Glass
Mica
Nylon
Wool
Cat fur
Silk
Paper
Cotton
Wood
Lucite
Sealing wax
Amber
Polystyrene
Polyethylene
Rubber balloon
Sulfur
Celluloid
Hard rubber
Vinylite
Saran Wrap
Negative

trickle charge—1. A continuous charge of a storage battery at a slow rate approximately equal to the internal losses and suitable to maintain the battery in a fully charged condition. 2. A continuous direct current, usually very low, that is applied to a battery to maintain it at peak charge or to recharge it after it has been partially or completely discharged. Usually applied to nickel-cadmium (nicad) or wet-cell batteries.

trickle charger—A device for charging a storage battery at a low rate continuously, or for several hours at one time.

tricolor camera—A television camera designed to separate reflected light into three frequency groups, each corresponding to the light energies of the three primary colors. The camera transforms the intensity variations of each primary into amplitude variations of an electrical signal.

tricolor picture tube—A picture tube that reproduces a scene in terms of the three light primaries.

tricon—A radionavigational system in which an airborne receiver accepts pulses from a triplet (chain of three stations) in a variable time sequence so that the pulses arrive at the same time even though traveling over paths of various lengths.

trigatron—An electronic switch in which breakdown of an auxiliary gap initiates conduction.

trigger—1. To cause, by means of one circuit, action to start in another circuit, which then functions for a certain length of time under its own control. 2. A pulse that starts an action or function; for example, a triggered sweep or delay ramp. 3. A timing pulse used to initiate the transmission of signals through the appropriate circuit signal paths.

trigger action—The instantaneous initiation of main current flow by a weak controlling impulse in a device.

trigger circuit—1. A circuit with two conditions of stability, with means for passing spontaneously or through application of an external stimulus from one to the other when certain conditions are satisfied. *See also* flip-flop, 1. 2. A circuit in which an electron tube performs the function of a relay. Impulses applied to the input of the

tube produce corresponding impulses in the output circuit, starting a chain of events.

trigger countdown—A process that reduces the repetition rate of a triggering signal.

trigger diode—A symmetrical three-layer avalanche diode used to control SCRs and triacs. It has a symmetrical switching mode and therefore fires whenever the breakover voltage is exceeded in either polarity of applied voltage.

triggered blocking oscillator—A blocking oscillator that can be reset to its starting condition by the application of a trigger voltage.

triggered spark gap—A fixed spark gap in which the discharge passes between two electrodes and is struck (started) by an auxiliary electrode called the trigger, to which low-power pulses are applied.

triggered sweep—In a cathode-ray oscilloscope, a sweep initiated by a signal pulse.

trigger electrode—See starter, 2.

trigger flip-flop—See T flip-flop.

trigger gap—A gas-discharge device with three electrodes that can be triggered upon command. Two electrodes provide the main conduction path, and the third electrode serves as the trigger.

triggering—The starting of circuit action, which then continues for a predetermined time under its own control.

triggering signal—The signal from which a trigger is derived.

trigger level—1. In a transponder, the minimum receiver input capable of causing the transmitter to emit a reply. 2. The instantaneous level of a triggering signal at which a trigger is to be generated. Also the name of the control that selects the level.

trigger point—The amplitude point on the input pulse at which triggering of the sweep of a cathode-ray oscilloscope occurs.

trigger pulse—A pulse used for triggering.

trigger-pulse steering—In transistors, the routing or directing of trigger signals (usually pulses) through diodes or transistors (called steering diodes or transistors) so that the signals affect only one of several associated circuits.

trigger recognition—In random-sampling-oscilloscope technique, the process of making a response to a suitably applied trigger, such as the time reference for the time window.

trigistor—A bistable pnpn semiconductor component with characteristics comparable to those of a flip-flop or bistable multivibrator.

tri-gun color picture tube—See tri-color picture tube.

trim—To make a fine adjustment in a circuit or a circuit element.

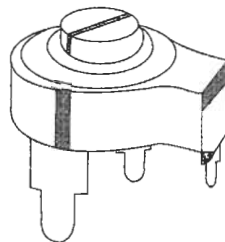
trim control—On some regulated power supplies, a control used to make minor adjustments of output voltage.

trimmer capacitor—Also called a trimmer. 1. A small variable capacitor associated with another capacitor and used for fine adjustment of the total capacitance of the combination. 2. A small capacitor, usually adjustable by screwdriver, that is placed in parallel with a larger capacitor and used to tune the high-frequency end of the circuit more precisely. 3. A small adjustable circuit element connected in series or parallel with a circuit element of the same kind such that its adjustment sets the combination of the two to a desired value.

trimmer potentiometer—A lead-screw-actuated potentiometer.

trimmer resistor—A small rheostat used in place of a fixed resistor to permit adjustment of resistance values in a circuit during initial calibration of an equipment or when recalibration is required.

trigger countdown — triode thyristor



Trimmer capacitor.

trimming—1. The fine adjustment of capacitance, resistance, or inductance in a circuit. 2. The process of using abrasive or laser technique to accurately remove film material from a substrate to change (increase) the resistance value. Thick films are trimmed using either abrasives or lasers; thin-film resistors are laser trimmed. Automated laser trimming is possible using computer-controlled systems. 3. The process of cutting away a portion of a thick-film resistor in order to raise the nominal resistance value. Resistors can often be trimmed to within 1 percent of a desired value. Cutting is done with an air abrasive tool or with a laser beam. The width of the cut is called the kerf.

trimming potentiometer—An electrical mechanical device with three terminals. Two terminals are connected to the ends of a resistive element, and one terminal is connected to a movable conductive contact that slides over the element, thus allowing the input voltage to be divided as a function of the mechanical input. It can function as either a voltage divider or rheostat.

trim notch—The notch made in a resistor by trimming to obtain the design value. See kerf.

trinistor—A three-terminal silicon semiconductor device with characteristics similar to those of a thyatron; used for controlling large amounts of power.

trinoscope—1. Any assembly of three kinescopes producing the red, green, and blue images required for tricolor television optical projection (e.g., for theater TV). 2. A color television viewing system with three kinescopes, three lenses, and three deflection yokes used to form the red, green, and blue images required for a tricolor television projection.

triode—A three-electrode electron tube containing an anode, a cathode, and a control electrode (grid).

triode amplifier—An amplifier in which only triode tubes are used.

triode field-effect transistor—A field-effect transistor having a gate region, a source region, and a drain region. Where no confusion is possible, the term may be abbreviated to field-effect triode.

triode-heptode converter—A superheterodyne converter circuit that uses a triode local oscillator and a heptode converter, both contained in one envelope.

triode-hexode converter—A superheterodyne converter circuit that uses a triode local oscillator and a hexode converter, both contained in one envelope.

triode laser—A gas laser whose light output may be modulated by applying signal voltages to an integral grid.

triode-pentode—A dual-purpose vacuum tube containing a triode and a pentode in the same envelope.

triode pnpn-type switch—A pnpn-type switch having an anode, cathode, and gate terminal.

triode thyristor—A three-electrode thyristor, of which one electrode is the gate. Commonly it has three terminals.

trip coil—An electromagnet in which a moving armature trips a circuit breaker or other protective device and thereby opens a circuit under abnormal conditions.

trip computer—Digital and push-button dashboard electronic system (Chrysler Corp.) that displays readout of speed, miles, fuel, time, and performs computations involving any of these parameters.

trip-free relay—*See* tripping relay.

triple-conversion receiver—A communications receiver in which three different intermediate frequencies are employed to give better adjacent-channel selectivity and greater image-frequency suppression.

triple detection—*See* double superheterodyne reception.

triple diffused—Pertaining to transistors fabricated within a monolithic substrate by three diffusion steps.

triple-play tape—Abbreviated TP tape. Very thin recording tape of which it is possible to wind 3600 ft (1097 m) onto a 7-inch (17.8-cm) spool. This would give 180 minutes of playing time at 3 ips (9.525 cm/s).

triple-stub transformer—A microwave transformer consisting of three stubs placed a quarter-wavelength apart on a coaxial line. The stubs are adjusted in length to compensate for impedance mismatch.

triplet—1. Three radionavigational stations operated as a group for the determination of position. 2. The waveform of the output voltage of a delay line when the input pulse has a width approximately equal to the resolution of the delay line.

triplex—*See* triad, 4.

triplex cable—A cable made up of three insulated single-conductor cables twisted together with or without a common insulating covering.

triplexer—A dual duplexer that permits the use of two receivers simultaneously and independently in a radar system by disconnecting the receivers during the transmitted pulse.

triplex system—A system for simultaneously sending two messages in one direction and one message in the other direction over a single telegraph circuit.

tripod—A three-legged camera support.

tripping device—A mechanical or electromagnetic device used for opening (turning off) a circuit breaker or starter, either when certain abnormal electrical conditions occur or when a catch is actuated manually.

tripping relay—Also called trip-free relay. A device that functions to trip a circuit breaker, contactor, or equipment, or to permit immediate tripping by other devices, or to prevent immediate reclosure of a circuit interrupter in case it should open automatically even though its closing circuit is maintained closed.

trip protection circuit—A protective circuit that electrically interrupts the output when an overload occurs.

trip voltage—Also called firing voltage. The voltage at which ionization occurs under any circumstances.

trip-wire switch—A switch that is actuated by breaking or moving a wire or cord installed across a floor space.

tristor—A fast-switching semiconductor consisting of an alloyed junction pnp device in which the collector is capable of electron injection into the base. Its characteristics resemble those of a thyatron electron tube, and the switching time is in the nanosecond range.

tristate—Also called three-state. 1. Logic systems utilizing three conditions on one line: a definite applied high voltage (logical 1); a definite low voltage (logical 0); and an open circuit or undefined state, permitting another part of the circuit to determine whether the line will be high or low. Usually refers to device outputs or systems using outputs of the tristate type. Useful in a

bus-organized system. 2. An output configuration found in several logic families that is capable of assuming three output states: high, low, and high impedance. The feature is useful for interconnecting large numbers of devices on the same wires while allowing only one to control the levels of the lines at a given time.

tristate device—A device that has three states: on, off, and electrically disconnected.

tristimulus values—The amounts of each of the three primary colors that must be combined to match a sample.

tri-tet oscillator—A crystal-controlled, electron-coupled vacuum-tube oscillator that is isolated from the output circuit through use of the screen-grid electrode as the oscillator anode. Used for multiband operation because it generates strong harmonics of the crystal frequency.

tritium—A radioactive isotope of hydrogen with an atomic number of 3.

TRL—Abbreviation for transistor-resistor logic.

Trojan horse—1. Software that, while performing a useful function, has hidden in it code for a program that performs security-breaching or fraudulent functions. 2. A program or data that seems innocuous when loaded into a system or network but later facilitates an attack by a hacker or a virus.

trombone—An adjustable U-shaped coaxial line matching assembly.

tropicalization—A chemical treatment developed to combat the fungi that ruin electronic equipment in hot, humid jungle regions.

tropo—*See* tropospheric scatter communication.

troposphere—The lower layer of the earth's atmosphere, extending to about 60,000 feet (18,300 m) at the equator and 30,000 feet (9150 m) at the poles. In this area the temperature generally decreases with altitude, clouds form, and convection is active.

tropospheric scatter—The propagation of radio waves by scattering as a result of irregularities or discontinuities in the physical properties of the troposphere.

tropospheric scatter communication—Also called tropo. A method or system of transmitting, within the troposphere, microwaves in the UHF or SHF bands to effect radiocommunication between two points on the earth's surface separated by moderate distances of from 70 to 600 miles (112 to 965 km). Such a span or hop may be augmented by other spans in tandem to permit end-to-end or through circuits up to many thousands of miles. More specifically, this method of communication is now generally understood to embrace a radio system that permits communication over the distances indicated, with excellent reliability and good information capacity, using relatively high transmitted power, frequency modulation, and highly sensitive receiving apparatus.

tropospheric superrefraction—The phenomenon occurring in the troposphere whereby radio waves are bent sufficiently to be returned to the earth.

tropospheric wave—A radio wave that is propagated by reflection from a place of abrupt change in the dielectric constant of its gradient in the troposphere. In some cases, the ground wave may be so altered that new components appear to arise from reflections in regions of rapidly changing dielectric constants; when these components are distinguishable from the other components, they are called tropospheric waves.

trouble—Failure of a circuit or element to perform in a standard manner.

trouble-location problem—A computer test problem whose incorrect solution supplies information on the location of faulty equipment. It is used after a check problem has shown that a fault exists.

troubleshoot—See troubleshooting.

troubleshooting—Also troubleshoot. 1. Locating and diagnosing malfunctions or breakdowns in equipment by means of systematic checking or analysis. 2. The work necessary to discover the cause of trouble; also implies the correction of the trouble by elimination of the cause.

trouble unit—A weighting figure applied to indicate the expected performance of a telephone circuit or circuits in a given period of time.

tr switch—See transmit-receive switch.

tr tube—Transmit-receive tube. A gas-filled rf switching tube that permits use of the same antenna for both transmitting and receiving by preventing the transmitted power from damaging the receiver. (Usually, a tr unit consists of a cavity containing a discharge gap that connects the transmitter to the antenna, and a coupling circuit that connects the antenna to the receiver when the discharge gap is not fired, indicating that the transmitting tube is quiescent.)

true bearing—A bearing given in relation to geographic north, as opposed to a magnetic bearing.

true complement—See radix complement.

true course—A course in which the direction of the reference line is true rather than magnetic north.

true credit balance—In a calculator, when the answer is negative, the minus sign automatically appears in the display.

true homing—The following of a course in such a way that the true bearing of an aircraft or other vehicle is held constant.

true north—Geographic north.

true ohm—The actual value of the practical unit of resistance. It is equal to 10^9 absolute electromagnetic units of resistance.

true power—The average power consumed by a circuit during one complete cycle of alternating current.

true radio bearing—See radio bearing.

true random noise—A noise characterized by a normal or Gaussian distribution of amplitudes.

true value—The value of a physical quantity that would be attributed to an object or physical system if that value could be determined with no error.

truncate—1. To drop digits of a number of terms in a series, thereby lessening precision. For example, the value 3.14159265 (π) when truncated to five figures is 3.1415, whereas it could be rounded off to 3.1416. 2. To conclude a computational process according to some rule; for example, to stop the evaluation of a power series at a specified term. 3. The dropping of digits or characters from one end of a data item, causing loss of precision or information.

truncated paraboloid—A paraboloid reflector in which a portion of the top and bottom have been cut away to broaden the main radiated lobe in the vertical plane.

truncation—The process of dropping one or more digits at the left or right of a number without changing any of the remaining digits. For example, in most operations the number 3847.39 would become 3847.3 when truncated one place at the right, whereas the same number would become 3847.4 when rounded correspondingly. See also round off.

truncation error—The error resulting from the use of only a finite number of terms of an infinite series, or from the approximation of operations in the infinitesimal calculus by operations in the calculus of finite differences.

trunk—1. A single message circuit between two points, both of which are switching centers and/or individual message distribution points. 2. A communications channel between two different offices, or between groups

of equipment within the same office. 3. A telephone line or channel between two central offices or switching devices, which is used in providing telephone connections between subscribers. 4. A major link in a communication system, usually between two switching centers.

trunk circuit—A circuit that connects two switching centers.

trunk facility—That part of a communication channel connecting two or more leg facilities to a central or satellite station.

trunk group—Those trunks connecting two points, both of which are switching centers and/or individual message distribution points and which make use of the same multiplex terminal equipments.

trunk hunting—A method by which an incoming call is switched to the next consecutive number if the first called number is busy.

trunk loss—That part of the repetition equivalent assignable to the trunk used in the telephone connection.

truth table—1. A tabulation that shows the relation of all output logic levels of a digital circuit to all possible combinations of input logic levels in such a way as to characterize the circuit functions completely. 2. A matrix that describes a logic function by listing all possible combinations of inputs and by indicating the outputs for each combination.

TSC—Abbreviation for transmitter start code.

TSS—Abbreviation for time-sharing system. A computer operating system in which the processor's time is shared among simultaneous users, resulting in an interactive facility.

TTL or T²L—Abbreviation for transistor-transistor logic. A bipolar technology used for producing logic gates. Positioned in the evolution of logic families after RTL (resistor-transistor logic) and DTL (diode-transistor logic) and before ECL (emitter-coupled logic) and CMOS. See gate.

TTL or T²L compatible—The ability of a device or circuit to be connected directly to the input or output of TTL logic devices. Such compatibility eliminates the need for interfacing circuitry.

TTL-compatible circuits—Circuits that meet the input/output interface standards of transistor-transistor logic (TTL) circuits. These can be TTL circuits themselves, or circuits made with other technologies that conform to TTL standards.

TTY—An abbreviation of Teletype or teletypewriter unit.

TU—See terminal unit.

tuba—A powerful land-based radar jamming transmitter operated between 480 and 500 MHz. It was developed during World War II for use against night fighter planes.

tube—A hermetically sealed glass or metal envelope in which conduction of electrons takes place through a vacuum or gas.

tube bridge—An instrument used in the precise measurement of vacuum-tube characteristics. It contains one or more bridge-type measuring circuits, plus power supplies and signal sources for all possible electrode combinations.

tube coefficients—Constants that describe the characteristics of a thermionic vacuum tube (e.g., amplification factor, mutual conductance, ac plate resistance).

tube complement—The number and types of electron tubes required in an electronic equipment.

tube count—A terminated discharge produced by an ionizing event in a radiation-counter tube.

tube drop—The voltage measured across a tube, from plate to cathode, when the tube is conducting at its normal current rating.

tube electrometer—A thermionic vacuum tube adapted for use as an electrometer to measure potential difference.

tube heating time—The time required for the coolest portion of a mercury-vapor tube to attain its operating temperature.

tubing—Extruded nonsupported plastic materials designed as protection and electrical insulation for exposed components of electrical and electronic assemblies; as opposed to a coated, braided, or woven tube, termed sleeving.

tube noise—Noise originating in a vacuum tube (e.g., from shot effect, thermal agitation, etc.).

tube shield—A metallic enclosure placed over a vacuum tube to prevent external fields from interfering with the function of the tube.

tube socket—A receptacle that provides mechanical support and electrical connection for a vacuum tube.

tube tester—A test instrument for indicating the condition of vacuum tubes used in electronic equipment.

tube voltage drop—The anode voltage in an electron tube during conduction.

tubular capacitor—A paper, ceramic, or electrolytic capacitor shaped like a cylinder; leads or lugs project from one or both ends.

tunable-cavity filter—A microwave filter in which tuning can be accomplished by adjustment of one or more screws that project into the cavity or by adjustment of the positions of one or more rectangular or circular irises in the cavity or waveguide.

tunable echo box—An echo box consisting of an adjustable cavity operating in a single mode. When the echo box is calibrated, the setting of the plunger at resonance will indicate the wavelength.

tunable magnetron—A magnetron that can be tuned mechanically or electronically over a limited band of frequencies.

tuned—Adjusted to resonate or operate at a specified frequency.

tuned amplifier—An amplifier in which the load is a tuned circuit. Thus, the load impedance and amplifier gain vary with the frequency.

tuned-anode oscillator—*See* tuned-plate oscillator.

tuned antenna—An antenna designed, by means of its own inductance and capacitance, to provide resonance at the desired operating frequency.

tuned-base oscillator—A transistor oscillator comparable to a tuned-grid electron-tube oscillator. The frequency-determining device (resonant circuit) is located in the base circuit.

tuned circuit—1. A circuit consisting of inductance and capacitance that can be adjusted for resonance at the desired frequency. 2. A circuit that is adjusted to be resonant at a particular frequency.

tuned-collector oscillator—A transistor oscillator comparable to the tuned-plate electron-tube oscillator. The frequency-determining device is located in the collector circuit.

tuned dipole—A dipole antenna that resonates at its operating frequency.

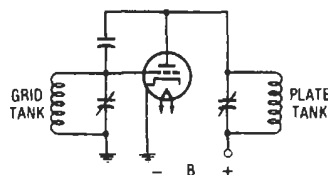
tuned filter—A resonant arrangement of electronic components that either attenuates signals at a particular frequency and passes signals at other frequencies, or vice versa.

tuned-filter oscillator—An oscillator in which a tuned filter is used.

tuned-grid oscillator—An oscillator whose frequency is determined by a parallel-tuned tank in the grid circuit. The tank is coupled to the plate to provide the required feedback.

tuned-grid, tuned-anode oscillator—*See* tuned-grid, tuned-plate oscillator.

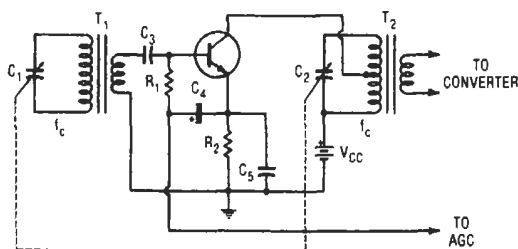
tuned-grid, tuned-plate oscillator—Also called tuned-grid, tuned-anode oscillator. An oscillator having parallel-resonant circuits in both the plate and the grid circuits. The necessary feedback is provided by the plate-to-grid interelectrode capacitance.



Tuned-grid, tuned-plate oscillator.

tuned-plate oscillator—Also called tuned-anode oscillator. An oscillator whose frequency is determined by a parallel-tuned tank in the plate circuit. The tank is coupled to the grid to provide the required feedback.

tuned radio-frequency amplifier—Abbreviated TRF amplifier. A tuned amplifier using resonant-circuit coupling and designed to operate at radio frequencies.



Tuned radio-frequency amplifier.

tuned radio-frequency receiver—Abbreviated TRF receiver. A radio receiver consisting of several amplifier stages that are tuned to resonate at the carrier frequency of the desired signal by a ganged variable-tuning capacitor. The amplified signals at the original carrier frequency are fed directly into the detector for demodulation. The resultant audio-frequency signals are again amplified, and are then reproduced by a speaker.

tuned radio-frequency transformer—Abbreviated TRF transformer. A transformer used for selective coupling in radio-frequency stages.

tuned-reed frequency meter—A vibrating-reed instrument for measuring the frequency of an alternating current.

tuned relay—A relay having mechanical or other resonating arrangements that limit the response to currents at one particular frequency.

tuned resonating cavity—A resonating cavity half a wavelength long, or some multiple of a half wavelength, used in connection with a waveguide to produce a resultant wave with the amplitude in the cavity greatly exceeding that of the wave in the guide. For reception of waves, a detecting grating can be placed at the point of maximum amplitude in the cavity to

convert the energy to a form suitable for amplification in a telephone or television circuit. A tuned cavity is a nonreflecting termination for a guide.

tuned rope—Long lengths of chaff cut to the various lengths necessary for tuning to different wavelengths.

tuned transformer—A transformer whose associated circuit elements are adjusted as a whole to be resonant at the frequency of the alternating current supplied to the primary, thereby causing the secondary voltage to build up to higher values than would otherwise be obtained.

tuner—In the broad sense, a device for tuning. Specifically, in radio-receiver practice: 1. A packaged unit capable of producing only the first portion of the functions of a receiver and delivering either rf, IF, or demodulated information to some other equipment. 2. That portion of a receiver that contains the circuits that are tuned to resonance at the received-signal frequency and those which are tuned to the local-oscillator frequency. 3. A radio or TV receiving circuit; a high-fidelity component containing such circuits.

tungar rectifier—A gaseous rectifier containing argon gas. It is employed in battery chargers and low-voltage power supplies.

tungar tube—A phanotron (hot-cathode gas-filled rectifier tube) having a heated filament serving as the cathode and a graphite disc as the anode in a bulb filled with low-pressure argon. Used chiefly in battery chargers.

tungsten—A metal used in the manufacture of filaments for vacuum tubes and in making contact points for switches and other parts where sparking may occur. After the tungsten is made ductile by rolling, swaging, and hammering, it is very tough.

tungsten filament—A filament used in incandescent lamps, and in thermionic vacuum tubes and other tubes requiring an incandescent cathode. Smaller tungsten filaments are operated in a vacuum, whereas those for larger lamps are used in an inert gas at about ordinary atmospheric pressure.

tungsten lamp—An evacuated bulb containing a tungsten filament that is heated by passing an electric current through it.

tuning—1. The adjustment relating to frequency of a circuit or system to secure optimum performance. Commonly, the adjustment of a circuit or circuits to resonance. 2. Making changes in a program to improve its performance without altering its results.

tuning capacitor—1. A variable capacitor for adjusting the natural frequency of an oscillatory or resonant circuit. 2. A variable capacitor that is intended to be mechanically actuated frequently throughout its life.

tuning circuit—A circuit containing inductance and capacitance, either or both of which may be adjusted to make the circuit responsive to a particular frequency.

tuning coil—A variable inductance for adjusting the natural frequency of an oscillatory or resonant circuit.

tuning control—A control knob that adjusts all tuned circuits simultaneously.

tuning core—Normally a molded iron core for permeability tuning, into which an adjusting screw has been cemented or molded.

tuning diode—A varactor diode used for rf tuning. This includes functions such as automatic frequency control and automatic fine tuning.

tuning eye—Slang for a cathode-ray tuning indicator.

tuning fork—A two-pronged hard-steel device that vibrates at a definite natural frequency when struck or when set in motion by electromagnetic means. Used in some electronic equipment as an accurately controllable source of signals, because its vibrations can be formed

readily into audio-frequency signals by means of pickup coils.

tuning-fork contact—A U-shaped female contact that resembles a tuning fork. It may be stamped or formed.

tuning-fork drive—Control of an oscillator by continuous vibrations of a tuning fork. A high harmonic of the oscillating signal obtained from the fork is selected by filter circuits and is strongly amplified to determine the main oscillator frequency in a transmitter or other equipment.

tuning in—Adjusting the tuning controls of a receiver to obtain maximum response to the signals of the station it is desired to receive.

tuning indicator—A device that indicates whether or not a receiver is tuned accurately. It is connected to some circuit in which current or voltage is maximum or minimum when the receiver is accurately tuned to give the strongest output signal.

tuning meter—A direct-current meter connected to a receiver circuit and used for determining whether the receiver is accurately tuned to a station.

tuning probe—An essentially lossless probe of adjustable penetration extending through the wall of a waveguide or cavity resonator.

tuning range—The frequency range over which a tuned circuit can be adjusted.

tuning screw—A screw or probe inserted into a transmission line (parallel to the E field) to produce susceptance of magnitude and sign that depend on the depth of penetration of the screw.

tuning stub—1. A short length of transmission line, usually with the free end shorted, connected to a transmission line to provide impedance matching. 2. A type of inductor element, usually adjustable, connected to a transmission line at intervals to improve the voltage distribution.

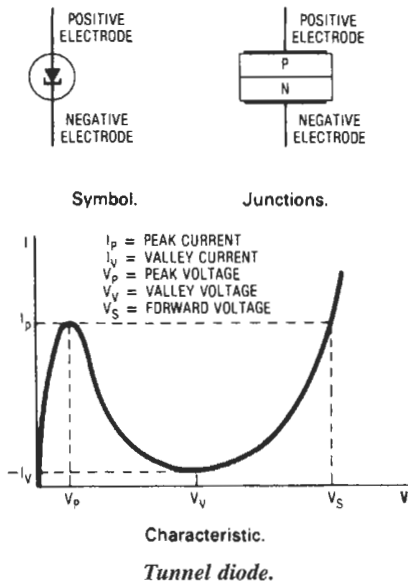
tuning susceptance—The normalized susceptance of an atr tube in its mount due to its deviation from the desired resonance frequency.

tuning wand—See neutralizing tool.

tunnel action (in a pn junction)—A process whereby conduction occurs through the potential barrier due to the tunnel effect and in which electrons pass in either direction between the conduction band in the n -region and the valence band in the p -region. (Tunnel action, unlike the diffusion of charge carriers, involves electrons only, and for all practical purposes the transit time is negligible.)

tunnel cathode—A metal-insulator-metal sandwich. Electrons tunnel from the metal substrate and appear in the metal film as hot electrons. Some of the hot electrons have sufficient energy to pass over the cathode surface barrier into the vacuum.

tunnel diode—Also called Esaki diode. 1. A pn diode to which has been added a large amount of impurity. The tunnel diode has high-speed charge movement and a negative-resistance region above a minimum level of applied voltage. With the addition of suitable external circuits, it can be used as an oscillator or amplifier. 2. A two-layer device similar to the rectifier diode. As a small voltage is applied, current starts to flow. Increase the voltage a little more and current drops to zero. Add still a little more voltage and the current increases again. At still higher voltages it responds like an ordinary diode. That first surge of current is called tunneling. 3. A heavily doped junction diode based on tunneling effect: the piercing of a potential barrier by a low-energy electron. Has a forward negative resistance, and is an excellent low-noise microwave amplifier. It has no upper-frequency limitation. 4. A diode utilizing the tunnel effect. It gives rise to negative differential conductance in a



certain range of the forward direction of the current-voltage characteristic.

tunnel effect—1. The piercing of a potential hill by a carrier, which would be impossible according to classical mechanics, but the probability of which is not zero according to wave mechanics, if the width of the hill is small enough. The wave associated with the carrier is almost totally reflected on the first slope, but a small fraction crosses the hill. 2. In a pn transition region, a process whereby conduction occurs through a potential barrier and in which electrons pass in either direction between the conduction band in the n-region and the valence band in the p-region. The tunnel effect, unlike the diffusion of charge carriers, involves electrons only and is for all purposes an instantaneous process.

tunneling—An observed effect of the ability of certain atomic particles to pass through a barrier that they cannot pass over because of the required energy level. It is based on a law of quantum mechanics that predicts that the particles have a finite probability for tunneling according to their quantum-mechanical nature.

tunnel rectifier—A tunnel diode that has a relatively low peak-current rating in comparison with other tunnel diodes employed in memory-circuit applications.

tunnel resistor—A resistor containing a thin layer of metal plated across a tunneling junction, so that the characteristics of a tunnel diode and an ordinary resistor are combined.

tunnel triode—A transistorlike device in which the emitter-base junction is a tunnel diode and the collector-base junction is a conventional diode.

tunnel luminescence—The emission of light from a phosphor film deposited on the surface of a thin-film metal-oxide-metal sandwich.

turbidimeter—See opacimeter.

turbulence amplifier—1. Fluidic digital element using laminar-to-turbulent flow transition to create the control effect. 2. A fluidic device in which the power jet is at a pressure such that it is in the transition region of laminar stability and can be caused to become turbulent by a secondary jet or by sound.

turn—One complete loop of wire.

turnaround time—1. The interval between the time at which a job is submitted to a batch processing system

and the time at which the results are returned. 2. The actual time required to reverse the direction of transmission in a half-duplex circuit. For most communications facilities, time is required for line machine reaction. (A typical time is 200 milliseconds on a half-duplex telephone connection.) 3. The period required for half-duplex modems to reverse the direction of transmission on dial-up or two-wire leased lines. This includes the time for reversing the echo suppressors used on the two-wire simplex paths between telephone central offices. These suppressors are placed between central offices to prevent signals from one transmission path from crossing over into another. Also, for synchronous modems, turnaround time covers line equalization and bit synchronization. A full-duplex modem has no turnaround time when used in a point-to-point link, since it can transmit and receive information simultaneously.

turn factor—Under stated conditions, the number of turns that a coil of given shape and dimensions placed on a core in a given position must have for a coefficient of self-inductance of 1 henry to be obtained for the core.

turnkey—1. A computer console containing a single control, usually a power switch, that can be turned on and off only with a key. 2. A design and/or installation in which the user receives a complete running system. 3. Pertaining to a computer system sold in a ready-to-use state.

turn-off delay time—The time interval between occurrence of the trailing edge of a fast input pulse and the occurrence of the 90-percent point of the negative-going output waveform.

turn-off reversal—A polarity reversal of the output of the electronic power supply occurring from the turning off of the power of a regulated power supply.

turn-off thyristor—A thyristor that can be turned from the on state to the off state, and vice versa, with appreciable gain by applying control signals of appropriate polarities to the gate terminal.

turn-off time—The time that a switching circuit (gate) takes to stop the current in the circuit it is controlling.

turn-on delay time—The time interval from the occurrence of the leading edge of a fast input pulse to the occurrence of the 10-percent point of the positive-going output waveform, assuming that the rise time of the incoming pulses is 0.1 of the rise time of the element to be measured under loaded conditions.

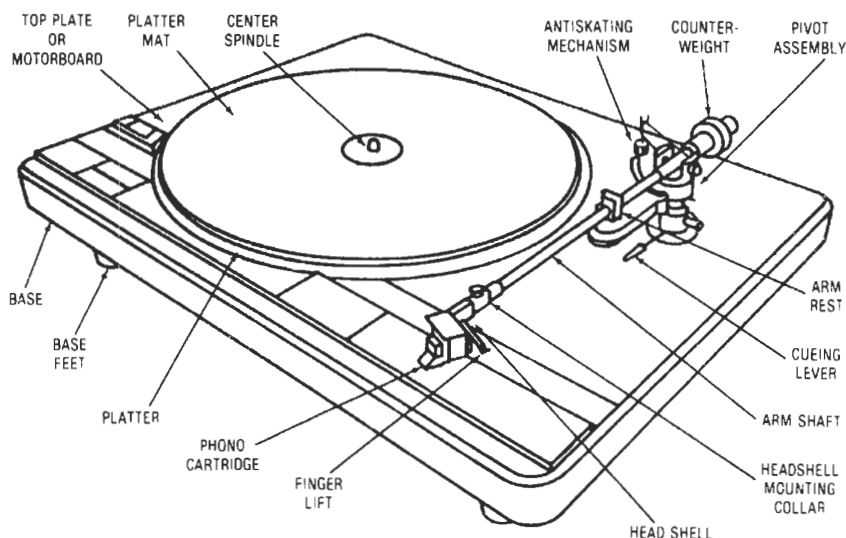
turn-on overshoot—Overshoots occurring from the turning on of power of a regulated power supply.

turn-on reversal—A polarity reversal of the output of the power supply occurring from the turning on of the power supply of a regulated power supply.

turnover cartridge—A phonograph cartridge adapted, by the use of two styli, to play both large- and fine-groove records.

turnover frequency—1. In disc recording, the frequency below which constant-amplitude recording is used and above which constant-velocity recording is employed. 2. The knee of the tone control or filter frequency response curve. Though normally thought of as the frequency at which the control begins to have its effect, the turnover point is actually the frequency at which response has already been altered by 3 dB relative to the unfiltered signal. Some tone controls and filters offer a choice of turnover frequencies that are usually switch-selected.

turnover pickup—Also called dual pickup. A pickup designed for playing both standard and micro-groove records, using a single magnetic structure. See also turnover cartridge.

*Turntable.*

turns ratio—The ratio of the number of turns in the primary winding to the number in the secondary winding of a transformer.

turnstile antenna—An antenna composed of two dipole antennas normal to each other and with their axes intersecting at their midpoints. Usually the currents are equal and in-phase quadrature.

turntable—1. The round platter on which a phonograph record rests during cutting or playback. Also refers to the platter and its driving motor and associated parts, as a high-fidelity component. 2. In tape recording, the rotating flat disc on which the reel (or, in some professional machines, the tape "pie") lies slightly raised above the recorder's front or top panel. The turntable is usually fitted with a center spindle and gripping keys of some kind to keep the reel centered and prevent it from slipping against the rotation of the turntable.

turntable rumble—See rumble, 1.

turret—A revolving plate mounted at the front of some television cameras and carrying two or more lenses of different types to permit rapid interchange of lenses.

turret tuner—A television-receiver tuner containing a separate set of resonating circuit elements for each channel. Each set is mounted on an insulating strip or strips placed on a drum rotated from the channel position for the desired channel.

TV—Abbreviation for television.

TV camera—An optical device, consisting of lens, electron beam tube, and preamplifier, that converts an optical image into an electrical signal.

TV channel—See television channel.

TVI—Abbreviation for television interference.

TV recording—A permanent record of video signals recorded photographically, electronically, or by other means, and which may be displayed through a television system or projected as a motion-picture film.

TVRO—See television receive only.

TVT—See TV terminal.

TV terminal—Abbreviated TVT. A keyboard and electromagnetic deflection-type display unit that utilizes an ordinary (or modified) TV set as a display.

tweaking—1. The process of adjusting an electronic receiver circuit to optimize its performance. 2. The fine tuning of a circuit with overly critical adjustments,

repeated several times until no further improvement in performance is obtained. This usually requires considerable skill and is not recommended as a requirement in circuits for production or construction by a hobbyist with limited technical resources.

tweeter—Also called a high-frequency unit. 1. A speaker intended to reproduce the very high frequencies, usually those above 3000 Hz, in a high-fidelity audio system. Units may be ionic, ribbon, electrostatic, or dynamic types. 2. A high-frequency speaker (driver) specializing in treble reproduction.

twelve punch—A punch in the top row of a card.

twenty-one type repeater—A two-wire telephone repeater in which one amplifier serves to amplify the telephone currents in both directions. The circuit is arranged so that the input and output terminals of the amplifier are in one pair of conjugate branches, while the lines in the two directions are in another pair.

twenty-two type repeater—A two-wire telephone repeater with two amplifiers. One amplifies the telephone currents being transmitted in one direction, and the other the telephone currents being transmitted in the other direction.

twilight—A scene illumination of approximately one footcandle.

twin axial cable—A single shielded twisted-pair cable that has low-loss signal transmission and high noise immunity.

twin cable—1. A cable composed of two parallel insulated stranded conductors having a common covering. 2. A pair of insulated conductors twisted and/or sheathed or held together mechanically and not identifiable from each other in a common covering.

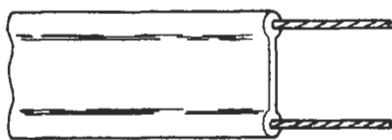
twin check—A continuous check of computer operations accomplished by duplication of equipment and automatic comparison of results.

twin coaxial cable—A configuration containing two separate, complete coaxial cables laid parallel or twisted around each other in one complex.

twinflex—British word for twisted pair of wires or twin lead.

twin lead—Also called twin line. A type of transmission line covered by a solid insulation and comprising two parallel conductors, the impedance of which is determined

by their diameter and spacing. The three most common impedance values are 75, 150, and 300 ohms.



Twin lead.

twin line—See twin lead.

twinning—1. The intergrowth of two crystal regions having opposite oriented axes. Two types of twinning may occur: electrical and optical. In electrical twinning, the electrical senses of the crystal axes are reversed and the twinned regions will interfere with one another piezoelectrically. It is this effect that limits the high-temperature utility of quartz as a piezoelectric material. 2. A defect of natural quartz crystals, in which both the right and left quartz are in the same crystal.

twin-T network—See parallel-T network.

twin triode—Two triode vacuum tubes in a single envelope.

twin wire—A cable composed of two small, parallel, insulated conductors having a common covering.

twist—1. The progressive rotation of the cross section of a waveguide about the longitudinal axis. 2. The deviation from a plane surface measured from one corner to the corner diagonally opposite. 3. The difference (in decibels) between DTMF high-group and low-group signal levels, mathematically defined as $10 \log (\text{high-group power})/(\text{low-group power})$. Measured at the DTMF receiver, it's a function of both the level difference generated by the signal source and the gain-frequency characteristic of the transmission facility.

twisted joint—A union of two conductors wound tightly around each other. A sleeve may be used, and it and the conductors twisted.

twisted pair—1. A cable composed of two small insulated conductors twisted together without a common covering. The two conductors of a twisted pair are usually substantially insulated, so that the combination is a special case of a cord. 2. Two insulated wires (signal and return) that are twisted around each other in a spiral pattern mainly to cancel the effects of electrical noise. Since both wires have nearly equal exposure to any electrostatic or electromagnetic interference, the differential noise is slight.

twister—A piezoelectric crystal that generates a voltage when twisted.

twistor—A computer memory element containing inclined helical windings of magnet wire on a nonmagnetic wire, with another winding over the helix. Information is stored in the form of polarized helical magnetization.

two-address—In a computer, having the property that each complete instruction includes an operation and specifies the location of two registers, usually one containing an operand and the other the result of the operation.

two-address code—A computer code that uses two address instructions.

two-address instruction—A computer instruction that includes an operation and specifies the location of two registers.

two-conductor jack—Receptacle having two circuits, tip and sleeve.

two-cored screened cable—British term for two-conductor shielded cable.

two-dimensional circuitry—See thin-film integrated circuit.

two-fluid cell—A cell having unlike electrolytes at the positive and negative electrodes.

two-hole directional coupler—A directional coupler that consists of two parallel coaxial lines in contact, with holes or slots through their contacting walls at two points one-quarter wavelength apart. With this device, a portion of the rf energy traveling in one direction through the main line may be extracted, while energy traveling in the opposite direction is rejected. It is necessary that one end of the secondary line be terminated in its characteristic impedance.

two-level system—A laser that uses only two electron energy levels. Electrons in the ground state (level 1) are pumped to the excited state (level 2). The electrons then surrender their energy by stimulated emission and return to the ground state.

two-out-of-five code—A type of positional notation in which each decimal digit is represented by five binary digits; two of the five are of one kind (for example, 1s) and three are of the other kind (for example, 0s).

two-part code—A randomized code with an encoding section and a decoding section. In the encoding section, the plaintext groups are arranged in alphabetical or other significant order, accompanied by their code groups in nonalphabetical or random order. In the decoding section, the code groups are arranged in alphabetical or numerical order and accompanied by their meanings given in the encoding section.

two-phase—Also called quarter phase. Having a phase difference of 90 electrical degrees, or one quarter-cycle.

two-phase current—Two currents delivered through two pairs of wires at a phase difference of one quarter-cycle (90°) between them.

two-phase dynamic—Pertaining to a dynamic logic circuit that uses two clock signals to control the processing of information through the circuit or logic system.

two-phase, five-wire system—An alternating-current supply in which four of its conductors are connected as in a four-wire, two-phase system and the fifth is connected to the neutral points of each phase and usually grounded. Despite its name, it is strictly a four-phase, five-wire system.

two-phase, four-wire system—A system of alternating-current supply comprising two pairs of conductors, between one pair of which is maintained an alternating difference of potential displaced in phase by one-quarter of a period from an alternating difference of potential of the same frequency maintained between the other pair.

two-phase, three-wire system—An alternating-current supply consisting of three conductors. Between one conductor (known as the common return) and each of the other two, alternating differences of potential that are 90° out of phase with each other are maintained.

two-piece contact—A contact made of two or more separate parts joined by swedging, brazing, or other means of fastening to form a single contact. This type provides the mechanical advantages of two metals but also has the inherent electrical disadvantage of difference in conductivity.

two-pilot regulation—The use of two pilot frequencies within a transmitted band so that the change in

attenuation due to twist can be detected and compensated for by a regulator.

two-plus-one address—Pertaining to an instruction that contains two operand addresses and one control address.

two-port network—A network with two ports.

two-pulse canceler—A moving-target indicator canceler that compares the phase variation of two successive pulses received from a target. It discriminates against signals with radial velocities that produce a Doppler frequency equal to a multiple of the pulse-repetition frequency.

two-quadrant multiplier—Of an analog computer, a multiplier in which operation is restricted to a single sign of one input variable only.

twos complement—Pertaining to a form of binary arithmetic used in a computer to perform binary subtractions with addition techniques. The twos-complement negative of a binary number is formed by complementing each bit in the number and adding 1 to the result.

twos-complement binary—An alternate and more widely used code to represent negative values. With this code, zero and positive values are represented as in natural binary, and all negative values are represented in a twos-complement form. That is, the twos complement of a number represents a negative value so that interface to a computer or microprocessor is simplified.

two-source frequency keying—Keying in which the modulating wave shifts the output frequency between predetermined values derived from independent sources.

two-state device—A mechanical or electronic device that, except during the time it is changing between states, is intended to be operated in either of two states or conditions.

two-terminal network—A network that is connected by only two terminals to an external system.

two-terminal-pair network—Also called a four-pole, quadripole, or quadrupole network. A network with four accessible terminals grounded in pairs. One terminal of each pair may coincide with a network node.

two-tone keying—Keying in which the modulating wave causes the carrier to be modulated with one frequency for the marking condition and a different frequency for the spacing condition.

two-tone modulating—A method of modulating in which two different carrier frequencies are used for the two signaling conditions.

two track (half track)—A tape format in which the width of the tape is recorded in two parallel magnetic tracks, separated by an unrecorded guard band. As compared with four-track recording, the two-track system gives improved dynamic range and can be edited without loss of program, since the tape is passed in a single direction only.

two-track recorder—See dual-track recorder.

two-track recording—On quarter-inch-wide tape, the arrangement by which only two channels of sound may be recorded, either as a stereo pair in one direction or as separate monophonic tracks (usually in opposite directions).

two-value capacitor motor—A capacitor motor that uses different values of effective capacitance for starting and running.

two-wattmeter method—A method of measuring total power in a balanced or unbalanced three-phase system by adding the readings of two wattmeters, each with its current coil in one phase and its voltage coil connected between it and the third phase.

two-plus-one address — type A₃ waves

two-way amplifier—An amplifier in which the right and left channels of a stereo system are both amplified simultaneously by the same tubes, using push-pull circuitry but feeding one signal to the input grids in parallel instead of push-pull. The parallel and push-pull signals are then separated by two output transformers in a matrixing circuit.

two-way communication—Communication between radio stations, each having both transmitting and receiving equipment.

two-way radio—Radiotelephone communications between fixed points (base stations) and portable units.

two-way repeater—See repeater.

two-way switch—A switch used for controlling electrical or electronic equipment, components, or circuits from either of two positions.

two-way system—A speaker in which the low and the high frequencies are reproduced separately by two electrically independent speaker elements, each of which is provided with a suitable sound-radiating system.

two-way, three-way, etc.—Refers to the number of frequency bands into which a speaker's output is divided. A two-way system divides the spectrum into two such bands, one of which is handled by a woofer or woofers, the other by a tweeter or tweeters. A three-way system would have one or more woofers, midrange speakers, and tweeters. Systems up to five-way are available.

two-wire channel—A two-way circuit for transmission in either direction.

two-wire circuit—1. A metallic circuit formed by two conductors insulated from each other. It is possible to use the two conductors as either a one-way transmission path, a half-duplex path, or a duplex path. Also used in contrast with a four-wire circuit to indicate a circuit using one line or channel for transmission of electric waves in both directions. 2. A communications circuit that uses a single pair of wires for both transmitted and received information.

two-wire repeater—A repeater that can be used for transmission in both directions over a two-wire circuit. In carrier operation, it usually makes use of the principle of frequency separation for the two directions of transmission.

two-wire system—1. A system of electric supply comprising two conductors, with the load connected between them. 2. A system in which all communication takes place over a two-wire circuit or the equivalent.

TWT—Abbreviation for traveling-wave tube.

TWX—See teletypewriter exchange service, 2.

Twystron—A very high power, hybrid microwave tube combining the input section of a high-power klystron with the output section of a traveling-wave tube. It is characterized by high operating efficiency and wide bandwidths.

.TXT files—Text files. These are usually just plain text that can be read by most programs.

type acceptance—Equipment authorization granted by the FCC to ensure that equipment will function properly in the service for which it has been accepted.

type A facsimile—Facsimile communication in which the images are built up of lines of constant-intensity dots.

type A waves—Continuous waves.

type A₁ waves—Unmodulated, keyed, continuous waves.

type A₂ waves—Modulated, keyed, continuous waves.

type A₃ waves—Continuous waves modulated by music, speech, or other sounds.

type A₄ waves — type-printed telegraphy

type A₄ waves—Superaudio frequency-modulated continuous waves, as used in a facsimile system.

type A₅ waves—Superaudio frequency-modulated continuous waves, as used in television.

type A₉ waves—Composite transmissions and cases not covered by type A through type A₅ waves.

typebar—A linear type element that contains all printable symbols.

type B facsimile—Facsimile communication in which the images are built up of lines of dots having a varying intensity (e.g., in telephotography and photo-radio).

type B waves—Keyed, damped waves.

type-printed telegraphy—Telegraphy in which the message is automatically printed at the receiving station.

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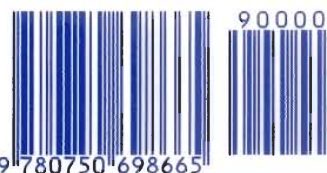


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