

Radio-Television-Electronics Dictionary

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**NATIONAL RADIO INSTITUTE
WASHINGTON, D. C.**

HOW TO USE THIS DICTIONARY

This book is a reference text and should be used as one. Do not read it as you would a Lesson, nor try to memorize the terms and their definitions.

Remember, a dictionary is not an encyclopedia, so do not expect to find complete explanations that belong in the Lessons. Non-technical words are not defined since they can be found in an ordinary dictionary. Where a word has two meanings, technical and non-technical, only the technical definition is given. (You might see a ghost, for example, on a television screen as well as in a haunted house. Only the first kind of ghost is defined here.)

Where there are two or more names for the same thing, the definition will be found under the most commonly used term, and the others will be cross-referenced to it in italic (slanting) type. Terms usually abbreviated have their abbreviations printed after them in parentheses. In addition, a list of all commonly used radio abbreviations will be found on pages 93-95, and a table of radio symbols is printed on page 96.

This dictionary has been completely rewritten to include the latest technical developments in radio, television, and electronics. Many of the terms here you may never run across, but complete coverage is provided in case you ever need it. Make use of it. It will save you time and trouble.

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Radio-Television-Electronics Dictionary

A

abampere. The unit of current flow in the absolute system of electromagnetic units (emu). One abampere is equal to 10 amperes.

A battery. The source of filament current for the tubes in a battery-operated vacuum-tube circuit.

abcoulomb. The unit of quantity of electricity in the absolute system of electromagnetic units (emu). One abcoulomb is equal to 10 coulombs.

aberration. A lens defect in which the light rays coming from a single point are brought to different focal points. See *chromatic aberration* and *spherical aberration*.

abfarad. The unit of capacity in the absolute system of electromagnetic units (emu). One abfarad is equal to 1,000,000,000 farads.

abhenry. The unit of inductance in the absolute system of electromagnetic units (emu). One abhenry is equal to .000000001 henry.

abohm. The unit of resistance in the absolute system of electromagnetic units (emu). One abohm is equal to .000000001 ohm.

AB power pack. A combination of batteries or other power-supplying devices in a single housing, used to supply filament and plate voltages for receivers, especially portable sets.

abrasive. A grinding or polishing material, specifically that incorporated in some phonograph records for the purpose of shaping the needle point to fit the groove properly.

abscissa. The coordinate value specifying distance in a horizontal direction from the vertical reference line on a graph. Also, the horizontal reference line along which these values are indicated.

absolute units. Units of measurement derived from the centimeter-gram-second (cgs) system of specifying length, mass, and time.

absolute value. The value of a number without regard to sign. Thus, the absolute values of +9 and -9 are both 9. In algebraic expressions vertical lines on each side of a quantity are used to specify that the absolute value is to be used. Example: the absolute value of x is written $|x|$.

absorption. Dissipation or loss of electromagnetic energy (radio waves) or acoustic energy (sound waves) in the medium through which the energy travels, or the extraction of electrical energy from one circuit by another coupled to it.

absorption coefficient. A measure of the ability of a material to absorb energy, especially from sound waves.

absorption modulation. Modulation produced by absorption of signal power from the antenna circuit system of a transmitter by a closely coupled antenna.

absorption trap. A tuned circuit coupled to another circuit for the purpose of absorbing and attenuating undesired signals.

absorption wavemeter. A device for measuring the wavelength or frequency of a radio wave, loosely coupled to a signal source so that it extracts enough energy to operate an indicator.

abvolt. The unit of potential in the absolute system of electromagnetic units (emu). One abvolt is equal to .00000001 volt.

accelerating electrode. An electrode in cathode-ray and vacuum tubes operated at a high positive potential to increase the velocity of the electrons.

acceleration. The rate of increase of velocity.

accentuation. The emphasizing of a frequency or range of frequencies in an amplifier or other electronic device; applied particularly to the increased amplification given the higher audio frequencies in FM transmitters.

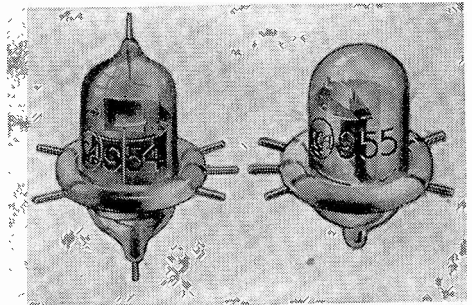
acceptor circuit. A circuit offering minimum impedance to a desired frequency or band of frequencies, and high impedance to all other frequencies.

ac-dc receiver. A receiver that will operate from either an ac or a dc power source. It has no power transformer. A *universal receiver*.

acetate disc. A disc for instantaneous recording, resembling a phonograph record, whose recording surface is an acetate plastic.

ac generator. Any device that produces an ac voltage, such as an oscillator or a dynamo-electric generator.

achromatic lens. A combination of two or more lenses, the curvature of one serving to correct the chromatic aberration of the others.



Acorn Tubes

Courtesy RCA

acorn tube. A small tube resembling an acorn in size and shape, designed to have low internal capacities, thus permitting its use in ultrahigh-frequency applications, up to about 400 megacycles.

acoustic. Pertaining to sound and hearing.

acoustic feedback. Transfer of energy from the sound waves coming from the loudspeaker to any preceding part in the same amplifying or broadcasting system in such a way that the current in the circuit is modulated, producing howling or squealing.

acoustic labyrinth. A winding passageway designed to lengthen the sound path from the front to the back of a loudspeaker. It lowers the cut-off frequency and extends the bass response.

acoustics. The science of sound. The study of the cause and effect of audible vibrations. Also the characteristics of a room or space that affect sound propagation and sound travel.

acoustimeter. A device for the electrical measurement of sound, having an output indicator calibrated in db or in units of sound intensity. A *sound-lever meter*.

ac plate current (Ip). The alternating component of the plate current of a tube. It is equal to the ac plate voltage divided by the total impedance in the circuit.

ac plate resistance (Rp). The opposition offered by the plate-cathode path of a tube to the flow of alternating current. With no load in the circuit, it is equal to the change in plate voltage divided by the resulting change in plate current, or to the ac plate voltage divided by the ac plate current.

ac receiver. A receiver designed to operate only from an ac power source.

active lines. The television image lines actually visible on the screen, those of the 525 image lines not blanked out.

acute angle. An angle that is less than a right angle (less than 90°).

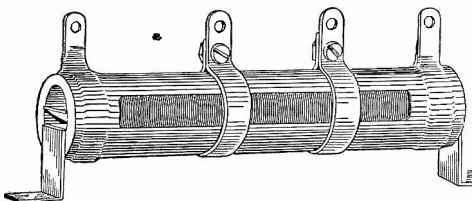
adapter. A device permitting the use of a substitute part or auxiliary apparatus, or for converting test equipment, or for converting a signal to a different frequency band, without change in the original equipment.

Adcock antenna. Two or more vertical conductors for reception or transmission of radio waves, arranged so that the interconnecting horizontal wires have little or no pickup.

adjacent-channel interference. Interference originating in the channels on either side of that to which the receiver is tuned. Loosely, interference from any channel near the desired one.

adjacent-channel selectivity. The ability of a receiver to reject the signals of stations on either side of the channel carrying the desired signal.

adjacent side. In a right triangle, the side of an acute angle that is between that angle and the right angle.



Adjustable Resistor

adjustable resistor. A wire-wound resistor having a movable tap that can be clamped at any desired point along the resistor.

adjustable voltage divider. A wire-wound resistor having three or more terminals, at least one of which is movable to permit its being clamped

at any desired point to adjust the voltage division.

admittance (Y). A measure of the ease with which an alternating current flows in a circuit. The reciprocal of impedance, measured in mhos. The word mho is ohm spelled backwards, indicating it is a reciprocal.

advance ball. The rounded support (often sapphire) which rides on the disc adjacent to the recording stylus of a sound recorder. It maintains even depth of cut by correcting for small irregularities in the surface of the disc.

aerial. An antenna.

afterglow. The continued emission of light by a phosphorescent material after excitation ceases. *Persistence, phosphorescence.*

air-cell battery. A non-rechargeable wet-cell battery delivering about 2.5 volts when new, used chiefly in 2-volt battery-operated home receivers. Its carbon electrodes are porous, and absorb oxygen from the air for depolarization purposes.

air condenser. A condenser having air as its dielectric.

air core. A magnetic circuit consisting only of air and other non-metallic materials.

air-core transformer. A transformer having a core (magnetic circuit) of air or other non-metallic materials, so that the magnetic lines of force travel only through these non-magnetic materials.

air gap. A path for electrical or magnetic energy through air between two objects, as between the electrodes of a spark gap or the core sections of an iron-core transformer.

airplane dial. Popular name for a circular radio receiver dial with a rotating pointer, resembling the dials and pointers of airplane instruments.

airport runway beacon. A radio signal used to indicate the approaches to an airport. Also, the transmitter producing such a signal.

Air Traffic Control (ATC). A system established by the CAA for issuing information and instructions to aircraft. At or near an airport it is called Airport Traffic Control, and along the airways, Airways Traffic Control.

Alexanderson alternator. A high-frequency ac dynamoelectric generator used in the early days of radio to produce radio waves.

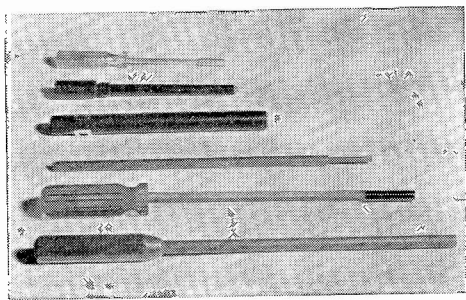
algebra. A continuation of arithmetic in which letters and symbols are used to represent definite quantities whose actual values may or may not be known. Example: In the equation $2x=10$, x must equal 5. A literal algebraic expression contains general numbers or letters. Example: $2\pi fL$ represents the number of ohms of inductive reactance; I^2R represents the number of watts of power.

algebraic subtraction. To subtract one number from another algebraically, change the sign of the number subtracted (the subtrahend), then add algebraically. Examples: To subtract 7 from 10, change 7 to -7 and add algebraically to get 3. To subtract 14 from -20 , change 14 to -14 , then add -14 and -20 algebraically to get -34 . To subtract -7 from 40, change -7 to 7 and add, getting 47.

algebraic sum. The sum obtained by adding numbers with regard for their signs. To add numbers having like signs, find the sum of their absolute values and place the common sign in front of the result. Example: The

algebraic sum of -3 , -5 , -1 and -10 is -19 . To add two numbers having unlike signs, find the difference of their absolute values, and place the sign of the larger absolute value in front of the result. Example: The algebraic sum of 7 and -3 is 4 ; the algebraic sum of -33 and 11 is -22 . When three or more numbers, some having different signs, are to be added algebraically, find the sum of the positive numbers first, then find the sum of the negative numbers. Finally, add the partial sums algebraically to get the total algebraic sum. Example: The algebraic sum of $+17$, -3 , -10 , and $+4$ is the algebraic sum of 21 and -13 , which is 8 .

align. To adjust tuning circuits so they respond to the desired frequency or band of frequencies. Also, to line up holes in two or more parts so a bolt can be passed through the holes, or to line up parts by positioning them in a straight line.



Aligning Tools

aligning tool. A small screwdriver or socket wrench, constructed partly or entirely from non-metallic materials, used for making neutralizing or aligning adjustments in radio receivers. The use of non-metallic materials eliminates body capacity that would affect the accuracy of the adjustments if an ordinary metal wrench or screwdriver were used.

alignment. The process of adjusting the tuning circuits in a receiver or transmitter so they respond to the desired frequency or band of frequencies.

alignment chart. A chart giving manufacturer's alignment instructions.

alive. Energized by being connected to an operating voltage source.

alligator clip. A long-nose clip with spring-controlled jaws and meshing teeth, used on test leads for making quick temporary connections.

all-metal tube. A vacuum or gaseous tube having a metal envelope or housing, with electrode connections being made through glass beads fused into the metal envelope. Usually called a metal tube.

alloy. A mixture of two or more metals. For example, bronze is an alloy of copper and tin.

all-wave antenna. A receiving antenna designed to pick up stations over a wide range of carrier frequencies, including short-wave bands as well as the broadcast band.

all-wave oscillator. An *all-wave signal generator*.

all-wave receiver. A radio receiver capable of receiving stations on all commonly used broadcast bands. The most common all-wave receivers have a range from 500 kc to 30 mc.

all-wave signal generator. A test instrument capable of generating any of the radio-frequency signals needed in aligning or servicing all-wave receivers (approximately 100 kc to $20,000$ kc).

Alnico. An alloy of iron, aluminum, nickel, and cobalt, that holds magnetism indefinitely, used in permanent magnets for loudspeakers, motors, dynamotors, meters, and motor-generators. There are several kinds of Alnico, differing in magnetic characteristics, identified by a number, as Alnico III, Alnico V.

alternating current. An electric current that reverses direction of flow at regular intervals.

alternation. One half of a cycle, consisting of a complete rise and fall of current in one direction. Thus, 60 -cycle alternating current has 120 alternations per second.

alternator. A dynamoelectric generator for producing ac voltages.

aluminized-screen picture tube. A cathode-ray picture tube in which a thin layer of aluminum has been deposited on the back of the fluorescent surface to improve the brilliance of the image and prevent ion-spot formation.

aluminum. A metal extensively used in radio for shielding purposes, for foil plates and housings of electrolytic condensers, for the plates of gang tuning condensers, and for chassis and panel construction.

amateur. Any person who operates and experiments with short-wave transmitters as a hobby rather than for profit. Often called a "ham."

amateur bands. Bands of frequencies assigned to radio amateurs.

amateur operator. A person holding a license authorizing him to operate licensed amateur stations.

amateur-station call letters. Identifying call signal assigned to a licensed amateur operator. Amateur calls in a given country begin with a one- or two-letter prefix (W for U.S., and K for U.S. possessions), followed by a location-indicating numeral and two or more additional letters.

ambient temperature. The temperature of the air immediately surrounding a radio part.

American Morse Code. A dot-and-dash code commonly used for telegraphic communications over wires. It differs considerably from the International Morse Code used in radio.

American Radio Relay League (A.R.R.L.). An association of amateur radio operators and other persons interested in amateur radio.

American Wire Gauge. The gauge in common use in the U.S. for designating wire sizes (diameters). It has numbers ranging from 0000 as the largest size to 40 and higher for the smallest sizes. Formerly called Brown and Sharpe gauge (B. & S. gauge).

ammeter. An instrument used for measuring current flow in amperes.

amorphous. Uncrystallized.

ampere (amp). The practical unit of electric current flow. The current that will flow if a one-ohm resistance is connected to a one-volt source. The movement of approximately $6,280,000,000,000,000,000$ electrons past a given point in a circuit in one second.

ampere-hour. A current of one ampere flowing for one hour; a unit used chiefly to indicate the

- amount of electrical energy a storage battery can deliver before it needs recharging.
- ampere-hour meter.** An instrument that indicates or records the number of ampere-hours of energy drawn from a storage battery.
- ampere-turn.** A unit of *magnetomotive force*, or the strength of the magnetic field produced by a coil. The number of ampere-turns is equal to the coil current in amperes multiplied by the number of turns in the coil. One ampere-turn is equal to 1.257 gilberts.
- Amphenol.** A plastic material used for insulation, especially at high frequencies.
- amplidyne.** A motor generator used to amplify the effect of a low-current control system. The field excitation of the amplidyne generator is varied by the control, and the amplidyne output energizes the field of the controlled generator.
- amplification.** The process of increasing the current, voltage, or power of a signal by using transformers, tuned circuits, or vacuum tubes.
- amplification factor (μ).** A rating indicating the theoretical maximum amplification that can be provided by a given vacuum tube. It is equal to the ratio of the plate-voltage change to the grid-voltage change needed to produce the same change in plate current when a tube has no load.
- amplifier.** A device whose output is an enlarged reproduction of its input.
- amplifier operating angle.** That part of the grid signal voltage cycle during which plate current flows.
- amplify.** To increase; to enlarge.
- amplitude.** The amount of variation of a quantity from a reference value, usually zero. The amount of vertical displacement above or below a horizontal reference line on a graph. Also, the displacement of a phonograph record groove from its average or unmodulated position.
- amplitude distortion.** Distortion that occurs when the changes in the current or voltage output of a circuit are not exactly proportional at every instant of time to the input current or voltage changes. Amplitude distortion results in the production of harmonics not present in the original signal.
- amplitude-frequency-response characteristic.** See *frequency response*.
- amplitude modulation (AM).** A system of broadcasting, in which the amplitude of the transmitted signal varies in accordance with the instantaneous amplitude of the intelligence signal, at a rate corresponding to the frequency of the intelligence signal. This process produces sideband frequencies above and below the assigned carrier frequency.
- amplitude separation.** Separation of two or more signals of different amplitudes by arranging a circuit to pass signals that are either above or below a predetermined level. Specifically, separation of the synchronizing signal from the video component of a TV signal.
- amplitude separator.** The *clipper* or sync separator stage in a television receiver.
- amplitude-suppression ratio.** A measure of the ability of an FM receiver to limit or remove AM variations. The ratio of the undesired AM output to the desired FM output.
- angle.** The figure formed when two straight lines meet at a point. The lines are called the sides of the angle, and the point is called the vertex. An acute angle is less than 90° . A right angle is 90° . An obtuse angle is more than 90° .
- angle, electrical.** See *electrical angle*.
- angle of beam.** The angle enclosing the greater part of the energy transmitted from a directional antenna.
- angle of deflection.** In a cathode-ray tube, the angle between the two positions of maximum deflection of the electron beam.
- angle of divergence.** In a cathode-ray tube, the angle between the deflected electron stream and a longitudinal line through its center.
- angle of incidence.** The angle between a ray of light falling on a surface and the perpendicular to the surface at that point.
- angle of lag.** The angle by which a current or voltage lags behind another current or voltage. See *phase angle*.
- angle of lead.** The angle by which a current or voltage leads another current or voltage. See *phase angle*.
- angle of radiation.** The angle between the earth and the strongest part of the wave radiated from a transmitting antenna.
- angle of refraction.** The angle formed with respect to the normal when a ray of light passes from one medium to another.
- angstrom unit (A).** A unit of wavelength measurement equal to one hundred-millionth of a centimeter. The wavelength of visible light is between 4000 and 7000 angstrom units.
- angular frequency (ω).** Rate of vibration or rotation measured in radians per second. Angular frequency is 2π (6.28) times the number of vibrations or cycles per second.
- angular phase difference.** The phase difference expressed in radians or degrees.
- angular velocity.** The speed of a rotating body measured by an angle whose vertex is the center of rotation, and through which any point of the body moves in a given time. The angular velocity of a current or voltage is equal to 2π (6.28) times frequency.
- anion.** An electro-chemical term for a negative ion that moves toward the anode.
- annealing.** A process of softening metals by first heating and then cooling gradually.
- annular.** Ring-shaped.
- anode.** A tube electrode, commonly called the *plate*, and usually at a high positive potential with respect to the cathode. Identified on diagrams by the letter P.
- anode strap.** A metallic connector between selected anode segments of a multicavity magnetron.
- antenna.** A metallic structure or an arrangement of conducting wires or rods for picking up or radiating rf waves. An aerial.
- antenna array.** Two or more antennas coupled together so as to improve transmission or reception in a desired direction.
- antenna coil.** The coil in a receiver through which the antenna current flows, usually directly connected to the antenna and ground terminals.
- antenna coupler.** A device in a transmitter for

transferring rf energy from the final plate tank to the antenna. It may also serve to match the plate-tank impedance to the impedance of the transmission line.

antenna current. The current flowing in the antenna.

antenna effect. The error in the direction-indicating characteristic of a loop antenna due to capacity between the antenna and ground. In radio direction-finders, the antenna effect is cancelled out by the *balancer*.

antenna form factor. The ratio of the effective height of an antenna to its actual physical height.

antenna gain. The effectiveness of an antenna in a particular direction as compared to some standard antenna. The ratio of the power that must be supplied to the given antenna to that supplied a standard antenna to produce the same field strength in a desired direction. Antenna gain in db is equal to 10 times the log of this power ratio.

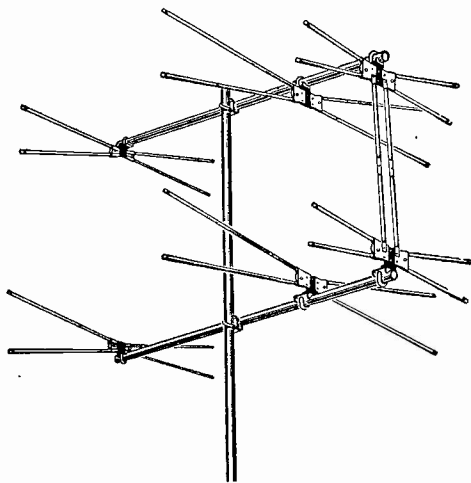
antenna power. The product of the square of the antenna current and the antenna resistance at the point where the current is measured.

antenna resistance. The total resistance of the transmitting antenna system at the operating frequency calculated at the point of maximum current.

anti-capacity switch. A switch designed with minimum capacity between the switch contacts or terminals.

antilog. *Antilogarithm.*

antilogarithm. The number corresponding to a logarithm. Usually written antilog. Example: The logarithm of 87.9 is 1.9440, and 87.9 is the antilog of 1.9440.



Courtesy JFD Mfg. Co.
Antenna Array

antinode. In a graphical representation of a wave, the point of maximum amplitude. The type of antinode is usually specified, since there can be antinodes of voltage, current, pressure, velocity, etc.

anti-resonant circuit. A parallel-resonant circuit.

aperiodic antenna. An antenna with a constant

impedance over a wide range of frequencies.

aperiodic circuit. A circuit with no definite time period of oscillation because its resistance is large enough to prevent natural oscillations, or because its capacity and inductance are of such values that they will not resonate in the tuning range.

aperture. A hole in a plate or other device used to control the diameter or position of an electron beam or a light beam.

aperture compensation. Reduction of aperture distortion by emphasizing the high-frequency components of the picture signal.

aperture distortion. Attenuation of the high-frequency components of the picture signal when the scanning spot covers several mosaic globules in a TV camera tube simultaneously.

aperture lens. In electron optics a hole in a plate electrode separating two electric fields. Electrons passing through the hole are deflected to produce focusing.

A power supply. Any device that provides filament power used for heating the cathode of a vacuum tube.

apparent power. In an alternating current circuit, the voltage in volts multiplied by the current in amperes, without consideration of phase relations. The apparent power is therefore not the true power if the circuit contains any reactance.

Applegate diagram. A diagram consisting of a number of lines whose slopes are proportional to electron velocities, and which indicates where the electrons will bunch in a velocity-modulated tube.

aquadag. A suspension of graphite particles in water, used to deposit a carbon coating on the glass envelopes of vacuum tubes and cathode ray tubes for any of several purposes, such as shielding the electrodes from light, absorbing heat, or collecting stray electrons. By extension, the coating itself.

arc. The flow of electric current through air, gas, or vapor.

arc-back. A breakdown of mercury vapor in mercury-vapor rectifiers permitting conduction in the opposite direction to normal.

arc converter. An rf oscillator utilizing an electric arc and a tank circuit to generate a pulsating or alternating current.

argon. A gas used in some rectifier tubes and electric lamps. It gives off a purple glow when ionized.

arm. The part or parts of a filter or attenuator that are connected in series with the circuit. Also called the series element.

armature. The part of a motor or generator that includes the main current-carrying winding. In dc machines the armature is the rotating part, but in ac machines it may either rotate or be stationary. Also, the pivoted or spring-mounted iron portion of a magnetic loudspeaker, vibrator, buzzer, relay, or magnetic phono pickup.

armature reaction. The reaction between armature flux and field flux causing a redistribution of flux lines in a dynamoelectric motor or generator.

array. See *antenna array*.

arrester. See *lightning arrester*.

artificial antenna. A device having all the essential

- characteristics of an antenna except that it converts the transmitter output power into heat instead of radio waves. Used chiefly for testing and adjusting transmitters. Also called *dummy antenna*.
- artificial line.** A filter circuit having characteristics similar to those of a transmission line of given length.
- artificial load.** A dissipative device having the impedance characteristics of an antenna, a transmission line, or some other practical utilization circuit, which it replaces for test or adjustment purposes.
- asbestos.** A non-inflammable mineral of fibrous texture, available in flake or pressed form, used for heat-insulating and fire-proofing.
- aspect ratio.** The ratio of the width of a television image to its height, currently standardized at 4 to 3.
- astatic.** Without polarity.
- astigmatism.** A defect of a lens or other optical system in which rays coming from one point of an object are not all brought to the desired focal point.
- A supply.** Filament voltage supply of a vacuum tube circuit such as an A battery or a filament winding on a power transformer.
- asynchronous.** Not synchronous.
- AT-cut crystal.** A crystal cut at a 35° angle to the Z axis. It has low temperature drift.
- atmosphere.** A complex mixture of gases, principally oxygen and nitrogen, surrounding the earth for a distance of nearly 100 miles, and exerting a pressure of 15 pounds per square inch at the surface of the earth, which value is a unit of pressure called one atmosphere.
- atmospheric duct.** See *duct*.
- atmospheric interference.** Crackling and hissing noises caused in the receiver by electrical disturbances in the atmosphere. These disturbances radiate electromagnetic waves that are picked up by antenna systems. Also called atmospheric disturbance, atmospheric noise, atmospherics, static, or QRM, and particularly noticeable during thunderstorms.
- atom.** The smallest particle into which matter may be divided by chemical means. An atom has a nucleus consisting of electrons, protons, neutrons, etc., with additional electrons revolving around the nucleus. Each of the known elements has a different number and arrangement of electrons and protons in its atoms.
- atomic weight.** The weight of any atom as compared to the weight of the oxygen atom, which is set at 16.
- attenuation.** The decrease in the strength of a radio wave as it travels away from the transmitter. Also any decrease in the strength of a signal or electrical impulse.
- attenuation equalizer.** A network of resistors, coils, and condensers designed to change the current amplitude in the circuit so that it varies in a desired way with frequency, without regard to phase.
- attenuator.** A device, usually an arrangement of variable resistances, that reduces the strength of a signal a desired amount without appreciable distortion.
- audibility.** The strength of a sound or signal as compared to the strength required to produce a sound that can just barely be heard.
- audible.** Capable of being heard. The range of human hearing is usually within the limits of 20 and 20,000 cycles per second, but varies greatly in different persons.
- audio.** Pertaining to currents or frequencies corresponding to normally audible sound waves.
- audio amplifier.** A vacuum tube stage that increases the voltage or power or both of an audio-frequency signal.
- audio frequency (af).** A frequency corresponding to an audible sound wave. The extreme limits of audio frequencies vary with the individual, normally from about 20 to 20,000 cycles per second.
- audio frequency meter.** An instrument for measuring audio frequencies.
- audio-frequency peak limiter.** A circuit used in an audio-frequency system to cut off peaks that exceed a predetermined value.
- audio-frequency transformer.** An iron-core transformer used for coupling audio-amplifier circuits.
- audiometer.** An instrument for measuring the loudness of sounds.
- audion.** The three-electrode vacuum tube invented by De Forest.
- audio oscillator.** An oscillator that generates audio-frequency voltages.
- audio signal.** The electrical equivalent of sound.
- audio transformer.** Audio-frequency transformer.
- aural.** Pertaining to hearing.
- aural-null direction finder.** A direction finder receiver in which a loop antenna is rotated until minimum sound is heard in the headphone; bearings are read from a compass scale associated with the loop antenna control.
- aural transmitter.** The radio equipment used for the transmission of the aural (sound) signals from a television broadcast station.
- auto alarm.** An automatic device for maintaining a continuous watch for distress signals, consisting of a receiver tuned to the international distress frequency, and a selector that will respond only to the international auto alarm signal.
- autodyne reception.** A system of heterodyne reception in which one tube acts both as an oscillator and a detector.
- Auto-Expressionator.** The volume-expander circuit used in some Crosley receivers.
- automatic.** Self-acting.
- automatic bass compensation (abc).** A resistor and condenser circuit used in some receivers to make low audio-frequency notes sound more normal at low volume-control settings. The circuit automatically compensates for the poor response of the human ear to weak low-frequency sounds.
- automatic brightness control.** A circuit that automatically keeps the average brightness of the reproduced image constant in a television receiver.
- automatic circuit-breaker.** A device that automatically opens a circuit when the current becomes excessive.
- automatic contrast control.** A circuit that varies the bias on one or more tubes so that the con-

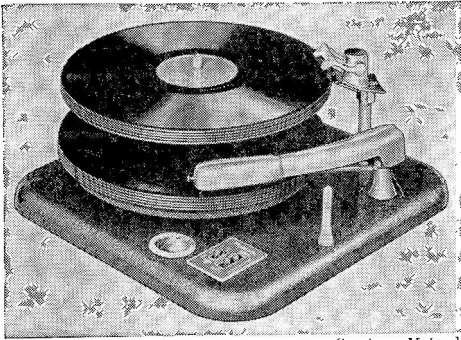
trast of the television picture is maintained at a constant average level.

automatic direction finder (adf). Electronic device usually for marine or aviation use, that provides a bearing to any transmitter whose location is known.

automatic frequency control (afc). A circuit that keeps a superheterodyne receiver tuned accurately to a desired station.

automatic gain control (agc). A circuit that automatically maintains the output of a sound or TV receiver relatively constant despite variations in carrier signal amplitude. An *automatic volume control*.

automatic grid bias. Use of the voltage drop across a resistor in the grid or cathode circuit of a tube as the C bias voltage for the grid of the tube, eliminating the need for a separate C bias voltage source.



Automatic Record Changer

Courtesy Motorola

automatic record changer. An electric device that automatically plays a number of phonograph records one after another.

automatic regulator. A device for regulating a system so that changes in its functioning are carried out electrically or mechanically rather than manually.

automatic tuning. An electrical, electro-mechanical, or mechanical system that tunes a receiver automatically to a predetermined station when a button or lever is pushed.

automatic volume control (avc). An automatic gain control in a sound receiver.

automatic volume expansion (ave). A special audio circuit that increases the volume range of a radio program or phonograph record by making the weak passages weaker and loud passages louder.

automobile receiver. A receiver designed for installation in an automobile, usually underneath the dashboard. Filament voltages are obtained directly from the 6-volt automobile storage battery, and the required higher dc voltages are usually obtained from a vibrator power pack in the receiver. Also called auto radio.

auto radio. An automobile receiver.

Autosyn motor. See *Selsyn motor*.

auto-transformer. A transformer having one continuous winding. All of the winding serves as the secondary, and a part of the winding serves also as the primary, or vice versa.

average. The average of a number of quantities is obtained by dividing the sum of the quanti-

ties by the number of quantities involved.

average brightness. The average illumination in the television picture.

average power output. The radio-frequency power delivered to the output terminals of an amplitude-modulated transmitter averaged over a modulation cycle.

aviation channels. Frequency bands assigned for radio communication between aircraft and ground stations. They are both above and below broadcast-band frequencies.

B

back electromotive force (back emf). A voltage developed in an inductive circuit by a changing or alternating current, whose polarity is such that it opposes the change in current that produces it. Also called counter electromotive force.

background. The average illumination of a television scene, contained in the dc component of the video signal.

background control. See *brightness control*.

background noise. Noise heard along with a received program, due to atmospheric interference or to circuit noises.

background voltage. In a radio direction finder, any voltage induced in the loop other than the desired signal voltage.

back-lash. Movement or play in the gears or parts of a tuning mechanism or other system, allowing one gear to be moved a certain amount without moving connected gears or parts.

backlight. Illumination applied to the rear of the iconoscope in a film pickup to provide a minimum light level and thus assist in controlling shading.

back porch. The portion of the blanking pedestal occurring after the horizontal synchronizing pulse.

back-shunt signalling. A signalling system in which energy is delivered to the antenna when a telegraph key is closed and to a "back shunt" non-radiating circuit when the key is open.

back-wave. A signal heard from a telegraph transmitter with the key open because of improper neutralization of the transmitter amplifier.

baffle. A wood, metal, or composition horn, flat surface, or box used with a loudspeaker to increase the effective length of the air path from the front to the back of the diaphragm, thereby reducing interaction between sound waves produced simultaneously by front and back surfaces of the diaphragm and improving the fidelity of reproduction. Also, a disc with a hole in it, used in an electron gun to restrict electrons travelling at such an angle that they can't be focused into the beam.

Bakelite. A phenolic compound having high electrical resistance, used as an insulating material.

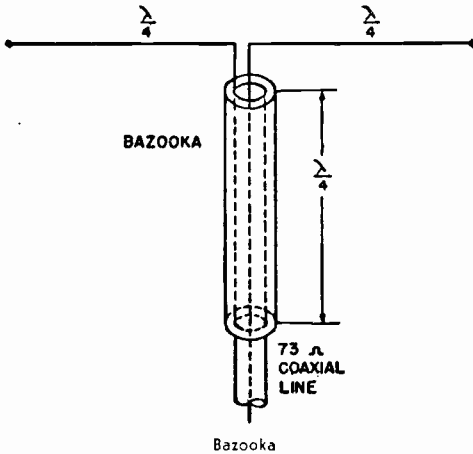
balanced armature unit. The driver unit used in some magnetic loudspeakers. It has a small moving iron armature surrounded by windings carrying audio currents and pivoted between the poles of a permanent magnet. Variations in the audio current cause corresponding changes in magnetism, making the armature rock back and forth. A diaphragm coupled to the armature produces sound waves.

- balanced circuit.** A vacuum-tube circuit in which the tube capacity is balanced or compensated for by an external capacity. Also, any circuit that is adjusted so that two factors balance each other.
- balanced modulation.** A system of adding sound to radio-wave transmission whereby only the sidebands are transmitted, the carrier being eliminated.
- balancer.** The portion of a radio-direction finder used to eliminate the antenna effect due to loop-ground capacity.
- balancing condenser.** A condenser used as part of a balanced circuit. Also, the condenser that makes both sides of a direction-finding loop equal in capacity to ground when the antenna is set for minimum signal pickup.
- ballast resistor.** A resistor that has the characteristic of greatly decreasing its resistance when current flow decreases, and increasing its resistance when current increases, thereby maintaining essentially constant current over a considerable range of voltage variation.
- ballast tube.** A ballast resistor mounted in an evacuated glass or metal envelope to improve the automatic voltage regulating action by reducing the radiation of heat from the resistor element. Also, a line-dropping resistor housed in a tube envelope.
- ballistic galvanometer.** An instrument for measuring a momentary discharge or pulse of energy. It is a microammeter having a coil with a high moment of inertia and no retarding spring, so that when energized, the indicator is free to rotate until stopped by friction. The total movement of the pointer until it comes to rest is proportional to the energy being measured.
- band.** A group of frequencies within two definite limits and used for a specified purpose. For example, the standard broadcast band extends from 550 kc to 1600 kc.
- band-elimination filter.** Two or more tuned circuits arranged to attenuate a band of frequencies between predetermined upper and lower frequency limits.
- band-pass filter.** Two or more tuned circuits arranged to pass a certain band of frequencies while attenuating or rejecting higher and lower frequencies.
- band selector.** A band switch that permits selection of any one of the bands in which a receiver or transmitter is designed to operate.
- bandspread tuning.** Tuning by means of a gang of low capacity condensers connected in parallel with the main tuning gang. After tuning to the desired band with the main gang, it is possible to "spread" that band over the bandspread dial because the small capacities give a smaller frequency change per degree of rotation. Also, a mechanical system for achieving the same result by using a vernier tuning knob having a high drive ratio, so that many turns of it are needed to move the main condenser gang appreciably.
- band switch.** A switch that simultaneously changes all tuning circuits of a radio receiver or transmitter to a desired band of frequencies.
- band width.** The difference in cycles per second between those two frequencies at which the response is a specified amount of the peak response.
- bank winding.** A method of winding coils in which successive turns are placed in two or more layers so that a multi-layer coil is wound without going back to the starting point. This procedure reduces the distributed capacity of the coil.
- bantam tube.** A compactly designed tube having a standard octal base but a considerably smaller glass envelope than a standard glass tube; designated by the letters GT following the tube type number.
- bar.** A term formerly used to mean a sound pressure of one dyne per square centimeter, but now avoided because in all fields except acoustics the bar is equal to 1,000,000 dynes per square centimeter.
- bar generator.** A generator for producing pulses equally separated in time that are synchronized so they produce a stationary bar pattern on a television screen for test purposes.
- barium.** A chemical element used in photoelectric cells.
- Barkhausen-Kurz oscillator.** An oscillator of the retarding field type in which the frequency of oscillation depends upon the electron transit time within the tube.
- bar magnet.** A magnetized straight bar of steel serving as a permanent magnet.
- barometer.** An instrument for measuring the pressure of the atmosphere, used chiefly for weather forecasting.
- bar pattern.** A pattern of repeating lines or bars on a television screen. The spacing between the bars is used to determine the degree of linearity of the horizontal or vertical scanning systems.
- base.** The number upon which a system of logarithms is constructed. The base of the common system of logarithms is 10. Example: $\log_{10} 10,000 = 4$, which means that $10^4 = 10,000$; $\log_{10} 351 = 2.545$, which means that $10^{2.545} = 351$. $\text{Log } e 453 = 6.116$, which means that $e^{6.116} = 453$. The base is designated to the right of and below the abbreviation "log"; when no base is specified in ordinary problems of computation, the base 10 is always assumed.
- basket winding.** A criss-cross coil winding in which each turn is so placed that adjacent turns are separated by a considerable space except at the points of crossing, reducing the distributed capacity of the coil.
- bass.** Low audio frequencies, generally considered to be those frequencies below 300 cycles per second.
- bass-boost circuit.** A circuit designed to emphasize low audio frequencies.
- bass compensation.** Any means for offsetting the natural drop in the response of the human ear to low audio frequencies at low volume levels.
- bass control.** A manually adjusted control provided on a receiver for the purpose of emphasizing low audio frequencies.
- bass response.** The ability of a loudspeaker or amplifier to handle low audio notes, or the sensitivity of the human ear to low audio notes.
- bathtub condenser.** A capacitor enclosed in a metal can with rounded corners resembling a bathtub.
- battery.** One or more dry cells or storage cells connected together to serve as a dc voltage source.
- battery receiver.** A receiver using batteries as a source of power.
- baud.** The unit of telegraph signalling speed, in

terms of the duration of the shortest signaling pulse. A telegraphic speed of one baud is one pulse per second.

bay. One complete section of a number of amplifiers or other transmitter units mounted on racks. Also a section of a complex antenna array.

bayonet base. A type of tube and lamp base having two projecting pins on opposite sides that engage in corresponding slots in the bayonet-shell socket. Electrical contact is made by means of pins or rings on the bottom of the base.



bazooka. A quarter-wave shield used at the end of a coaxial transmission line to raise the impedance of the outer conductor to permit connecting to a balanced transmission line. A line balance converter.

B battery. A battery having many small cells connected in series, used for supplying dc voltages to the plate and screen-grid electrodes of radio tubes used in battery-operated equipment.

beacon. See *radio beacon*.

beacon course. The equisignal zone or beam of an aircraft radio beacon, designating a course through the sky.

beam. The stream of electrons passing from the cathode to the fluorescent screen of a cathode-ray tube. Also a constant radio signal transmitted for guidance of aircraft. Also, radiated energy that is concentrated and directed in a particular path.

beam angle. The angle enclosing a greater part of the energy transmitted from a directional antenna.

beam antenna. An antenna whose radiation or reception is practically confined to a narrow beam extending in a definite direction.

Beam-a-Scope. Trade name for a built-in shielded loop antenna used in some General Electric receivers.

beam bender. See *ion trap*.

beam, convergent. A beam of light whose rays meet (converge) at a single point.

beam current. The current in the stream of electrons in a cathode-ray tube.

beam, divergent. A beam whose rays spread out.

beam of light. A group or pencil of light rays.

beam, parallel. A beam of light whose rays are exactly parallel to one another.

beam power tube. A vacuum tube designed for use in the output stage of a radio receiver. Deflecting electrodes in the tube concentrate the electrons into beams which force secondary emission electrons back to the plate.

beam relaxor. A TV sweep oscillator that generates the current wave required for magnetic deflection of such amplitude that subsequent amplification is not needed.

bearing. A term used in navigation to designate the direction of one point with respect to another or to the points of a compass.

beat. A regularly recurring pulsation resulting from the combination of two or more tones or electric waves of different frequencies.

beat frequency. The frequency obtained when signals of two different frequencies are combined and rectified. The beat frequency is equal in numerical value to the difference between the original frequencies.

beat frequency oscillator (bfo). An audio-frequency oscillator whose output is obtained by combining and rectifying two known higher-frequency signals generated by or obtained from separate circuits. Also, an oscillator used to provide a beat signal when its output is mixed with an incoming cw signal, so that an audible output can be obtained.

beat-frequency receiver. Early name for a superheterodyne receiver.

beating. Combining of two different frequencies to produce a new signal having pulsations in amplitude at the difference or beat-frequency value.

beat note. An audible frequency produced by the beating of two higher frequencies.

bel. The unit for logarithmic expression of ratios of power, voltage, or current, named after Alexander Graham Bell, inventor of the telephone. The number of bels is the common logarithm of the power ratio. In radio work, a smaller unit called the *decibel* is used instead of the bel; a decibel is one-tenth of a bel.

B eliminator. A power pack that converts ac power line voltage to the pure dc voltages required by plate and screen-grid circuits of radio tubes, thereby eliminating the need for B batteries.

Bellini-Tosi direction finder. An early radio compass.

bell wire. A common name for the cotton-covered No. 18 copper wire used for making doorbell and thermostat connections in homes.

beta rays. Rays consisting of negatively charged particles or electrons. Cathode rays.

Beverage antenna. A directional antenna of low height, having a length that is some multiple of the received wavelength.

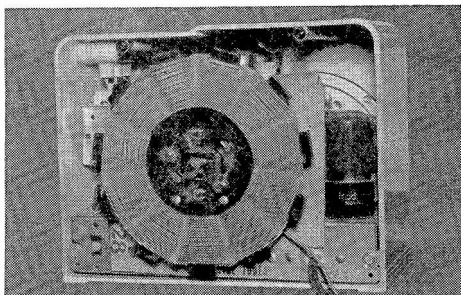
B-H curve. A curve showing the relationship between magnetic flux density, (B) produced in a magnetic path and the magnetic force per unit length (H) in that path.

bias. The fixed dc voltage applied between the control grid and cathode electrodes of a radio tube. Also called C bias.

bias cell. A tiny 1-volt or 1¼-volt cell used singly

- or in series combinations to provide a negative C bias voltage for a vacuum tube amplifier circuit.
- bias resistor.** The cathode resistor that provides a C-bias voltage for a tube.
- bidirectional.** In two directions, one opposite the other. An ordinary loop antenna is bidirectional, picking up energy from two opposite directions.
- bidirectional pulses.** Pulses, some of which rise in one direction and the remainder in the opposite direction.
- bilateral.** Having two sides.
- bilateral antenna.** An antenna that radiates or receives radio waves best in two directions 180° apart.
- bilateral network.** A network in which a given current flow in either direction causes the same potential drop.
- billboard array.** An antenna array consisting of stacked dipoles $\frac{1}{4}$ to $\frac{3}{4}$ wavelength apart with a large sheet-metal or screen reflector behind the dipoles.
- bimorph cell.** A cell consisting of two crystal elements cemented together, used in crystal headphones, microphones, pickups, and loudspeakers.
- binaural.** Having two ears, or the effect of hearing with both ears. Also, pertaining to sound transmitted over two different paths, creating the sensation of sound position.
- binaural effect.** The effect of sound on both ears. The difference in the two sound-path lengths makes it possible for a person to determine the direction from which a sound is coming.
- binder.** A resinous material that causes the various materials of a phonograph record compound to adhere to one another. Also, the cement-like material used for a similar purpose in carbon resistors and powdered-iron cores.
- binding post.** A terminal to which wires may be attached by screws or clamps for making quick electrical connections.
- bipolar.** Possessing two poles.
- birdie.** A high-pitched whistle. It is a beat note having a high audio frequency.
- blacker-than-black region.** That portion of the video signal above the black level. It contains the synchronizing pulses.
- black level.** In television, the voltage representing the color black. Usually it is not greater than 80% of the maximum television signal amplitude.
- blanking.** The process of applying negative voltage to the control grid of the cathode-ray tube to cut off the electron beam during the retrace or flyback period.
- blanking pedestal.** See *blanking pulse*.
- blanking pulse.** The signal introduced into the complex video signal at or above the black level, used to blank out video signals during the transmission of synchronizing signals.
- blasting.** A distortion of sound caused by overloading a microphone, loudspeaker, or some other part.
- bleeder current.** A current drawn continuously from a power-pack or other voltage source to improve voltage regulation or to increase the voltage drop across a resistor.
- bleeder resistor.** A resistor used to draw a fixed bleeder current from a power pack.
- blister.** Housing for radar antenna. A Radome.
- block diagram.** Simplified plan of an electronic system in which the several stages or sections are shown as rectangles.
- blocked-grid keying.** Method of keying a telegraph transmitter by applying sufficient bias to block tubes when the key is open. Closing the key removes the bias, allowing plate current to flow.
- blocked resistance.** That part of the resistance in a loudspeaker due to electrical losses. It can be measured only when the moving elements in a loudspeaker have been blocked so they cannot move.
- blocking.** Stopping of operation, as by applying a high negative bias to the grid of a tube to cut off plate current.
- blocking condenser.** A condenser used in a radio circuit to prevent the flow of direct current while allowing ac signal currents to pass.
- blocking oscillator.** A vacuum-tube oscillator operating intermittently, with grid bias increasing during oscillation to a point where it stops the oscillation, then decreasing to a point at which oscillation can be resumed.
- blooming.** Increase in spot size in a cro tube resulting from abnormal brilliancy. Also increase in picture size due to oversweeping because of reduced high voltage.
- blooper.** Slang term applied to a regenerative receiver which radiates a signal when improperly operated.
- blow-out magnet.** A permanent magnet or electromagnet used to extinguish an electric arc in an arc transmitter or on heavy-duty switches or relays by forcing the ionized gases out of the gap.
- bobbin.** A coil of wire wound on a form, or the form itself.
- body.** A mass or portion of matter separate from other masses.
- body capacity.** The capacity existing between the human body and a piece of radio apparatus.
- bombardment.** The striking of electrodes or other parts by ions or electrons.
- bonding.** Connecting metal objects together with heavy wire or metal straps so they will be at the same potential (usually ground potential).
- book condenser.** A two-plate condenser hinged like the pages of a book. Capacity variation is obtained by changing the angle between the plates.
- boom.** An adjustable mechanical arm for holding a camera or microphone in a number of different positions.
- boom shot.** A picture taken by a camera mounted on a boom. Loosely, any shot for which the camera is high.
- booster.** A pre-amplifier connected between the antenna and receiver to increase the signal strength at the receiver input.
- bootstrap circuit.** A circuit arranged so that the potential at some point is "lifted" to a higher potential with respect to ground by a feed-

- back arrangement, in addition to the potential changes caused by the signal.
- bounce.** Rapid and irregular changes in brightness of a TV picture. Also, irregular up and down movements of the picture.
- B power supply.** Any power-supply device connected in the plate circuit of a vacuum tube.
- breadboard construction.** Layout of radio parts and wiring so parts may be easily changed or moved during experimental work. Originally on a wooden board but now usually on a metal chassis.
- breakdown voltage.** The voltage at which the insulation between two conductors will become conductive.
- break-in keying.** A method of operating a radio telegraph communication system in which the receiver at the transmitter location is capable of receiving signals during transmission spacing intervals.
- break-in operation.** A type of radio communication in which the receiving operator can interrupt the transmitting operator at any time.
- bridge circuit.** A circuit consisting of four resistances or impedances connected in series to form a square, with a voltage source connected between one pair of opposite junctions and an indicator (usually a galvanometer) between the other pair. The bridge is said to be balanced when it is adjusted so no current flows through the indicating meter.
- bridged-T network.** A T-connected network with a fourth branch connected across the two series arms of the T, between an input terminal and on an output terminal.
- bridge rectifier.** A four-element rectifier circuit connected in the characteristic four-cornered arrangement of a bridge circuit. AC voltage is applied to one pair of opposite junctions or corners, and dc voltage is obtained from the other pair.
- bridging amplifier.** An amplifier requiring negligible input power that can be connected across another circuit without disturbing that circuit's normal function.
- bright level.** The voltage representing white, the brightest part of a TV image, usually set at about 15% of the maximum TV signal amplitude.
- brightness.** The background intensity of a television picture. Also, the measure of the amount of light flux radiated by an object, usually measured in foot-lamberts.
- brightness control.** In a television receiver, the control that varies the average illumination of the reproduced image.
- brilliance.** Degree of reproduction of the higher audio frequencies. Also, the brightness of a TV picture.
- brilliancy control.** Same as *brightness control*.
- British thermal unit (btu).** An English unit of measure of heat quantity. It is the heat required to raise the temperature of one pound of water at its maximum density, 1° F.
- broadband amplifier.** An amplifier having flat response over a wide range of frequencies.
- broadcast.** A radio transmission intended for reception by the general public.
- broadcast band.** The group of frequencies assigned to broadcast stations. In the U. S., the standard AM broadcast band is from 550 kc to 1600 kc; the FM broadcast band is from 88 to 108 mc; in between are several short-wave broadcast bands.
- broadcast interference.** Interference produced by any transmitter with any broadcast reception. Specifically, interference of amateur radio transmitters with reception on standard broadcast receivers.
- broadcast station.** A radio station used for transmitting programs to the general public.
- broadside directional antenna.** An antenna array whose radiation is substantially at right angles to the line along which its elements are arrayed.
- broad tuning.** A characteristic of a receiver wherein the pass band of the tuning circuits is wide.
- bronze.** An alloy of copper and tin.
- Brown and Sharpe Gauge.** See *American Wire Gauge*.
- brush.** A metal or carbon block used to make contact with a moving part in an electrical circuit.
- brush discharge.** Visible ionization occurring at sharp points, corners, or bends of conductors charged to high potentials. Corona discharge.
- brute-force filter.** A low-pass filter depending on large values of capacity and inductance rather than on resonant effects to block ac components while passing direct current.
- B supply.** Plate-voltage supply of a vacuum-tube circuit.
- buck.** To oppose.
- bucking coil.** A coil whose magnetic field opposes the magnetic field of another coil.
- buffer.** Any part or circuit used to reduce undesirable interaction between radio circuits.
- buffer amplifier.** An isolating amplifier in which the reaction of output load impedance variation on the input circuit is reduced to a minimum.
- buffer condenser.** A condenser used to reduce voltage surges that might affect following parts.
- bug.** A semi-automatic code transmitting key in which movement of a lever to one side produces a dot or a series of dots of equal duration and spacing, and movement to the other side produces a single dash. Also, a slang expression for a defect or trouble.
- built-in aerial.** An aerial that is an integral part of a receiver. A loop aerial, a power-line connection.



Built-in Aerial

tion, metal ribbons, or some other pickup device mounted in the receiver cabinet.

buncher grids. The elements in a velocity-modulated tube, such as a Klystron, whose potentials vary the electron velocities so that bunches of electrons are formed in the drift space.

bunching of electrons. Application of rapidly alternating fields to a uniform beam of electrons so that their velocities will be modulated. After a proper interval of travel, the faster electrons overtake preceding slower ones and bunches are formed that can be used to deliver energy to a resonant cavity.

bus bars. The heavy copper bars used on switchboards to carry current. Also, an uninsulated copper wire of about 12 or 14 gauge.

bushing. A tube or washer used for lining or insulating a hole in a chassis, or as a bearing.

butterfly condenser. A variable capacitor whose movable plates resemble the shape of a butterfly.

butterfly tank. A vhf resonant circuit using the mechanism of a butterfly condenser in such a way that the rotor varies both the inductance and the capacity, thus giving a wide tuning range.

buzz. A rasping sound ranging in frequency between a hum and a squeal. For example, an audible disturbance in the sound output of a television receiver due to synchronizing signals that get through the sound channel.

BX cable. Flexible metal conduit used to protect power line wiring in buildings and in high-power radio apparatus.

by-pass condenser. A condenser used to provide a low-impedance path around a part or circuit.

C

cabinet. The wood, metal, or plastic housing in which electronic equipment is placed.

cable. A bundle of two or more wires held together, as by lacing, shielding, or an insulating sleeving. Also a term applied to larger sizes of wire, used singly or in combination, usually heavily insulated, and often lead-covered.

cadmium. A metal sometimes plated on a steel chassis to improve its appearance and prevent rusting.

caesium. An alkali metal used in some photoelectric cells.

cage antenna. An antenna whose conductors are groups of parallel wires in a cylindrical arrangement.

calibrate. To determine by measurement or comparison the true values for each scale division of a meter or other instrument. To determine and record the settings of a control that correspond to particular values of frequency, voltage, current, or some other characteristic.

call letters. Government-assigned identifying letters for a radio or TV station.

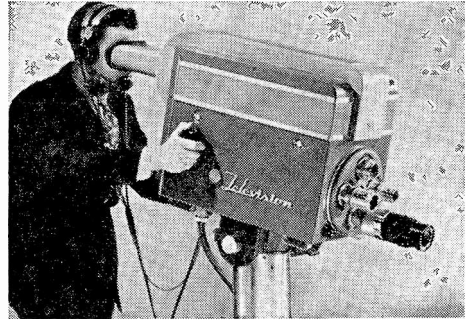
calorie. The unit of heat energy in the metric system. One calorie is the amount of heat energy required to raise the temperature of one gram of water one degree Centigrade. There are 252 calories in a British thermal unit (btu).

calorimetric wattmeter. An instrument for micro-

wave power measurements in which the rf energy is changed to heat and the amount of heat is measured.

cam. A rotating or sliding part used to convert rotary motion to linear motion, or vice versa, or to transfer motion from one direction to another.

cambric, varnished. A fine white linen or cotton fabric, varnish-impregnated and baked, and used as an insulating material in coils and other parts. When in the form of tubing, it is called spaghetti.



Camera

Courtesy RCA

camera. The part of a television transmitting apparatus in which the image of the scene to be televised is converted into equivalent electrical impulses.

camera chain. The group of amplifiers, monitors, and the sync generator associated with a TV camera; all the signal equipment between the camera and the transmitter.

camera preamplifier. A video amplifier, mounted in or very near the camera, for providing enough amplification to offset losses in the cable leading to the control room.

camera tube. The cathode-ray tube used at the television transmitter to change the light variations of the scene into an equivalent electrical signal.

candlepower (cp). Unit of measure of light intensity.

Candohm. A wire-wound resistor, usually tapped, wrapped in heavy fiber insulating paper and then encased in metal. Used for bleeder resistors and voltage divider applications.

capacitance. Capacity.

capacitive coupling. Coupling in which a condenser provides a path for signal energy between two circuits.

capacitive reactance. The reactance in ohms a condenser offers to ac. It decreases as either frequency or capacity or both are increased.

capacitor. A condenser.

capacitor split-phase motor. An induction motor using a series condenser to produce the rotating magnetic field required to bring an induction motor up to synchronous speed when operated from a single-phase ac source.

capacity (C). The ratio of the charge stored in a condenser to the voltage producing the charge. The unit of capacity is the farad; a capacity of 1 farad exists when a change of 1 volt per second produces a current of 1 ampere. In

radio work, capacity is measured in microfarads (mfd) and micromicrofarads (mmf); 1 mfd is equal to 1,000,000 mmf.

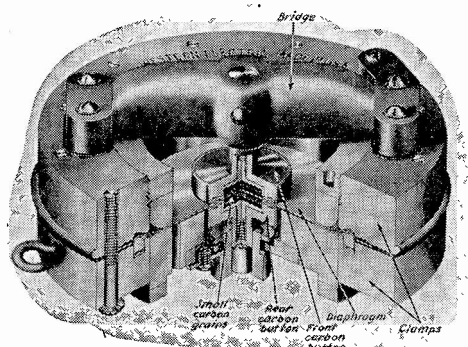
capacity bridge. A bridge for precise measurements of capacity.

carbon. An element used in the construction of radio parts such as resistors, dry cells, and microphones.

carbon granules. Small particles of carbon used in microphone buttons.

carbonized. Pertaining to an insulator that has been converted to a partial conductor by being burned by an arc, so that the residue of carbon acts as a conducting medium.

carbon microphone. A microphone in which the diaphragm applies a varying pressure to a container filled with carbon granules, thereby causing the resistance of the microphone to vary in accordance with the varying pressure of sound waves on the diaphragm.



Courtesy Western Electric Co.

Carbon Microphone

carbon-pressure recording. Electromechanical facsimile recording in which a pressure device acts upon carbon paper to register upon the record sheet.

carbon resistor. A resistor made of carbon particles and a ceramic binder usually molded into a cylindrical shape, with leads attached to opposite ends.

cardioid pattern. A heart-shaped pattern representing the response or radiation characteristics of certain antennas or the response characteristics of certain microphones.

carriage. The overhead feed mechanism of disc sound-recording equipment that carries the cutting head.

carrier. A current, voltage, or wave having the frequency assigned a radio or TV station.

carrier current. The alternating current associated with a carrier. Also, the rf carrier current sent over power lines for communication purposes.

carrier frequency. The frequency of the original unmodulated wave produced by a transmitter.

carrier-frequency stability. A measure of the ability of a transmitter to maintain an assigned frequency.

carrier level. The strength of a carrier, expressed as power or voltage, usually applied to an unmodulated carrier.

carrier noise level. The noise level produced by

undesired variations of a radio-frequency signal in the absence of any intended modulation.

carrier-operated noise suppression (CONS). A system in which the receiver is silenced (to eliminate noise) until the carrier exceeds a certain strength, set to be sufficient to override the noise. Used in communications systems in which the transmitter carrier is turned off and on frequently.

carrier suppression. A method of transmission in which the carrier wave is not transmitted.

carrier wave. The unmodulated component of a signal wave, usually called simply the carrier. It carries the sound, picture, code, or facsimile signals from the transmitting station through space to receivers.

carrying capacity. The maximum current strength a conductor can safely transmit without overheating.

cartridge fuse. A fuse enclosed in a cartridge in the shape of a rod or cylinder, with contacts at the ends.

cascade. In series, such as tuning circuits or amplifier stages used one after another.

cascade limiter. An FM limiter system using two or more limiter tubes in series, or cascade, to improve operation for both weak and strong signals.

catcher grids. The elements in a velocity-modulated tube, such as the Klystron, used to extract the energy contained in the bunched electrons.

cathode. The electron-emitting electrode of a radio tube.

cathode current. The total current passing from the cathode through space to the other electrodes in a vacuum tube.

cathode follower. A circuit in which the output is taken between cathode and ground, providing high-impedance input with low-impedance output.

cathode-heating time. The time in seconds required for the cathode of a tube to reach normal operating temperature after normal voltage is applied to the heater.

cathode keying. Method of telegraphic transmission in which the key is connected in the plate return lead to the cathode or filament center tap.

cathode modulation. Amplitude modulation in which the modulation is applied between the cathode and ground, thus varying the grid bias and plate voltage simultaneously.

cathode ray. A ray or beam of electrons emitted from a cathode.

cathode-ray oscilloscope. A test instrument using a cathode-ray tube to make visible the wave form of a varying current or voltage.

cathode-ray picture tube. The cathode-ray tube used in television receivers to reproduce the scenes being transmitted.

cathode-ray tube. Any vacuum tube in which a beam of electrons is directed at a fluorescent screen by an electron gun, producing a glow on the screen at the point of impact. The beam passes between electrostatic deflecting plates or electromagnetic deflecting coils that bend it enough to produce any desired pattern or picture on the screen when the proper varying voltages are applied to the deflecting system.

- cathode-ray tube screen.** The fluorescent material covering the inside surface of the picture end of a cathode-ray tube.
- cathode spot.** Heated area of the mercury surface in mercury pool rectifiers, serving as a source of electrons.
- cathode sputtering.** A process used in the production of the metal master of a phonograph record, wherein the wax or lacquer original is coated with a conducting layer by means of an electrical discharge in a vacuum.
- cation.** A positive ion.
- catwhisker.** A small, sharply pointed wire used in a crystal detector to make contact with a sensitive point on the surface of the crystal.
- cavity gap impedance.** The impedance of a cavity resonator across the gap.
- cavity resonance.** The characteristic of a cavity, determined by its dimensions, that causes it to have maximum response at a particular frequency.
- cavity resonator.** A space normally bounded by an electrically conducting surface in which oscillating electromagnetic energy is stored, the resonant frequency of which is determined by the size and shape of the enclosure.
- C battery.** The battery used for supplying a negative C bias voltage to the control grid of a vacuum tube.
- C bias.** An applied voltage used to make the control grid of a vacuum tube negative with respect to the cathode.
- C bias detector.** A vacuum tube operated with almost enough negative bias to cut off plate current. The tube operates on the lower bend of the characteristic curve, and detection takes place in the plate circuit.
- celestial navigation.** Calculation of position by the use of heavenly bodies.
- cell.** A single unit capable of serving as a dc voltage source. A primary cell, such as a dry cell, cannot be recharged when exhausted. A secondary cell, such as the cell of a storage battery, can be recharged by passing a current through it in the reverse direction. The term cell is also used to designate light-sensitive tubes (photoelectric cells and selenium cells).
- Celotex.** A fiber wallboard used in loudspeaker baffles because of its sound-absorbing qualities. Also used in radio and sound picture studios to control the amount of reverberation.
- center frequency.** In frequency modulation, the frequency of the unmodulated carrier. With modulation, the instantaneous frequency swings above and below the center frequency. In general, the average frequency of the emitted wave when modulated by a symmetrical signal.
- centering.** Shifting the trace on an oscilloscope or the image on a television tube so that it is centered on the screen.
- centering control.** An adjuster for shifting the image on the screen of a cathode-ray tube by varying either the dc potential applied to deflection plates, by varying the dc current through or the position of deflection coils, or by varying the position of permanent magnets. The vertical centering control moves the image up or down, and the horizontal centering control moves it to either side.
- center of curvature.** The point equidistant from all points on the surface of a spherical mirror.
- If the mirror is considered to be a segment of a complete sphere, the center of curvature would be the center of the sphere.
- center-tap keying.** Keying a telegraph transmitter stage by interrupting the current flowing to the filament center-tap connection through the plate return lead.
- centi.** A prefix denoting "a hundredth of."
- centigrade (C).** The metric scale of temperature, in which 0 is the freezing point and 100 is the boiling point of water at sea level.
- centimeter (cm).** In the metric system of measurements, a unit equal to one hundredth of a meter, or approximately .39 inch. There are 2.54 centimeters in one inch.
- ceramic.** A clay-like material, consisting mainly of aluminum and magnesium oxides, which after molding and firing is used as insulation. Glazed ceramic is porcelain.
- ceramic capacitor.** A capacitor whose dielectric is ceramic.
- chain.** A network of stations connected together by telephone lines or radio relay channels so that all can broadcast simultaneously a program originating at a key station. Also, a camera chain.
- changeover switch.** A switch at a two-way communications point, used to shift from sending to receiving and vice versa.
- channel.** A band of frequencies including the assigned carrier frequency, within which a station is required to keep its modulated carrier signal in order to prevent interference with stations on adjacent channels. Also, one branch or path over which signals may travel.
- characteristic.** The first part of a logarithm (to the left of the decimal point). Example: In $\log 461 = 2.6637$, the characteristic is 2. The characteristic of a number greater than 1 is positive and is one less than the number of digits to the left of the decimal point. The characteristic of a number less than 1 is negative, and is one more than the number of zeros immediately to the right of the decimal point.
- characteristic curve.** A curve plotted as a graph to show the relation of changing values. For example, a curve showing how the plate current in a vacuum tube changes with respect to a change in grid voltage.
- characteristic impedance.** The impedance in ohms at the input of an infinitely long line, or of a practical line with its far end closed by a matching impedance, equal to $\sqrt{L/C}$ of the line for all but very low frequencies.
- charge.** A quantity of electrical energy held on an insulated object. The electrical energy stored in a condenser. The act of supplying electrical energy to a metal object, to a condenser, or to a storage battery. When an object has more electrons than normal, it has a negative charge. When an object has less electrons than normal, it has a positive charge.
- charger.** A device for supplying direct current for charging a storage battery.
- chassis.** Assembled parts on a metal frame or base, not including the housing or cabinet. Also, the metal frame itself.
- chassis base.** The metal framework on which parts are mounted. The chassis.
- chassis punch.** A tool for making round or square holes in sheet metal.

Child's Law. An equation stating that diode current varies directly with the three-halves power of the anode voltage, and inversely with the square of the distance between the electrodes. Also known as Langmuir's equation, or the three-halves power equation.

chip. The material removed from a phonograph disc by the recording stylus in cutting the groove during sound recording.

choke coil. A coil used to limit the flow of alternating current while allowing direct current to pass.

chopper. A device for continuously breaking up a current or a ray of light.

Christmas-tree pattern. The optical pattern observed when the surface of a phonograph record is illuminated by a narrow beam of light, and indicating the quality of a recording.

chromatic aberration. The dispersive effect of a lens in which light rays of different color are not brought to the same focal point through failure of the lens to bend all colors of light the same amount.

chuck. A clamping device that holds the stylus or needle of a phonograph pickup. Also, a device that holds a drill bit, as in a hand drill or drill press.

cipher. A zero. Also, a secret code.

circuit. A complete path over which electrons can flow from the negative terminal of a voltage source through connecting wires and parts to the positive terminal of the same voltage source. Also the path taken by magnetic flux.

circuit breaker. An electromagnetic device that opens or breaks a circuit automatically when the current rises above a set value.

circuit-disturbance test. A professional servicing technique widely used for isolating the defective stage in a dead receiver. It depends on the fact that a disturbance introduced in any receiver stage will reach the reproducer only if all stages between the point of disturbance and the reproducer are in operating condition. The disturbance is introduced in each stage in turn, working from the reproducer toward the antenna; the first stage at which no response is obtained is the defective stage.

circularly polarized wave. A polarized wave in which the direction of displacement rotates with constant angular velocity about an axis in the direction of propagation.

circular mil. A unit of area used chiefly in specifying the cross-sectional areas of wires. The area of a circle whose diameter is one mil (.001 inch).

circular-mil-foot. A unit of wire measure having a cross-sectional area of one circular mil and a length of one foot.

Civil Aeronautics Administration (CAA). A government agency charged with establishing general air traffic rules and safety regulations, and operating weather and radio beacon stations, and Airways Traffic Control stations.

clamp. A device for compressing or holding together two or more parts.

clammer. A circuit that keeps either amplitude extreme of a signal at a specific potential level by inserting a dc level. The dc restorer is a clamper.

clamping. The process of re-establishing the dc level or base line of a waveform after it has been wiped out by ac-coupled video stages.

class A amplifier. An amplifier in which the grid bias and alternating grid voltages are such that plate current flows at all times.

class AB amplifier. An amplifier intermediate between class A and class B in its operation. It operates in class A on weak signals but approaches class B on strong ones. (Note: To denote that grid current does not flow during any part of the input cycle, the suffix 1 may be added to the letter or letters of the class identification. The suffix 2 may be used to denote that grid current does flow.)

class B amplifier. An amplifier in which the grid bias is approximately equal to the cut-off value so that the plate current is approximately zero when no exciting grid voltage is applied, and so that plate current flows for approximately one half of each cycle when an alternating grid voltage is applied.

class C amplifier. An amplifier in which the grid bias is appreciably greater than the cut-off value so that the plate current is zero when no alternating grid voltage is applied, and so that plate current flows for appreciably less than one half of each cycle when an alternating grid voltage is applied.

click filter. See *key-click filter*.

clip. A small spring clamp used for making a readily removable connection.

clipper. In a television receiver, the circuit that separates the control pulses from the video signal. Also called sync separator or amplitude separator. Also, a circuit for limiting the amplitude of a signal by removing all above a desired amplitude.

clipping. Separation of the control pulses from the video signals. Also, distortion in amplifiers produced by flattening of the plate current curve because of excessive grid current during the positive grid swing. Also, distortion in the af component of a modulated wave when modulation amplitude exceeds that which brings the trough to zero. Also, generation of square waves by shunting biased diodes across a load, the bias determining the amplitude at which the peaks are to be removed.

clipping level. The amplitude level at which a waveform is clipped.

clockwise. The direction in which the hands of a clock move.

close coupling. Coupling provided by an rf or i-f transformer when the primary and secondary windings are as close together as possible.

coaxial antenna. An antenna that is a quarter wavelength extension of the center conductor of a coaxial cable, with the outer conductor connected to and covered with a quarter-wavelength "skirt" or sheath.



Coaxial Cable

coaxial cable (coax). A high-frequency radio, television, or telephone transmission cable consisting of a central inner conductor separated from a cylindrical-shaped surrounding conductor by an insulator.

cobalt. A metallic element often combined with iron and steel to make alloys used in permanent magnets. It is less magnetic than iron, but retains its magnetism at temperatures as high as 1100 degrees Centigrade.

co-channel interference. Interference from an undesired signal having the same nominal carrier frequency as the desired signal.

codan. (Coined from Carrier Operated Device, Anti-Noise.) A *squelch circuit*.

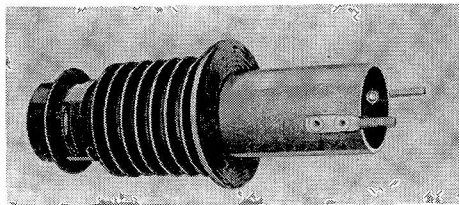
code. A system of dot and dash signals used in the transmission of messages by radio or wire telegraphy. The International Morse Code (also called the Continental Code) is used everywhere for radio telegraphy. The American Morse Code is used commonly for wire telegraphy. Also a system of sending secret messages.

code recorder. An instrument that makes a permanent record of code messages.

coefficient. Any factor of a product can be called the coefficient of the product of the remaining factors. Examples: In $2xy$, 2 is the coefficient of xy ; x is the coefficient of $2y$; y is the coefficient of $2x$. Usually, however, only the numerical part of an expression is called the coefficient. If there are no numbers in the expression, the coefficient is assumed to be 1.

coercive force. The amount of opposite magnetomotive force necessary to eliminate residual magnetism.

coherer. A device used in the early days of radio communication for detecting or rectifying signals by mechanical means.



Courtesy Essex Electronics

Coil

coil. A number of turns of wire offering considerable opposition to alternating current at the frequencies for which it is designed.

coil form. The tubing or solid object on which a coil is wound. It can have any shape and can be made from any insulating material, such as paper, cardboard, fiber, Bakelite, a plastic or ceramic material, glass, or wood.

coincidence counter. A device for counting pulses that occur in separate circuits at precisely the same time.

cold cathode. A cathode that does not depend upon heat for electron emission. The cold cathode of a photo-electric tube emits electrons when exposed to light, and in a rectifier tube such as the OZ4 the electrons are pulled out of the cold cathode when a sufficiently high voltage is applied to the anode to ionize a path between the two.

cold-cathode tubes. Tubes in which electron emission is obtained without heating the cathode.

collector. Any electrode for capturing electrons. Specifically, a conductive coating or ring on the inside of the glass envelope of a television camera tube, midway between the mosaic and the window end, for collecting the electrons that leave the light-sensitive mosaic surface.

collector rings. See *slip rings*.

collinear antenna array. An antenna array in which all the elements lie in the same straight line.

color. The visual sensation produced when light enters the eye. The color perceived depends on the wavelength of the light. A wavelength of 4000 angstrom units is perceived as violet and a wavelength of 7000 angstrom units as red, with all other color wavelengths between these limits. White is seen whenever the three primary light colors or two complementaries are present in equal proportions.

color code. Any system of colored markings used to indicate the electrical value of a part or to identify terminals and leads.

color disc. A disc containing red, blue, and green windows, rotated in front of the television camera or picture tube in a field-sequential color TV system.

color drum. A cylindrical tube containing red, blue, and green windows, rotated around a picture tube in a field-sequential color TV system.

color field. Scanning through the picture area once in the selected scanning pattern and in each of the primary colors. In the line-interlaced scanning pattern of two to one, it means the scanning of the alternate lines of the picture area once in each of the primary colors.

color frame. Scanning all of the picture area once in each of the primary colors. In the line-interlaced scanning pattern of two to one, a color frame consists of two color fields.

color response. The relative sensitivity of photo-electric cells, TV camera tubes, and of the human eye to light of various colors.

Colpitts oscillator. An oscillator in which a parallel-tuned tank circuit is connected between grid and plate, with the tank capacitance containing two voltage-dividing condensers in series, with their common connection at cathode potential and the necessary feedback voltage being obtained across the grid-cathode capacitor.

communications band. The active band of frequencies produced by modulation or keying of a particular transmitter. The ideal communications band is narrower than a channel, to prevent interference between stations having adjacent frequency assignments.

communications receiver. A receiver designed especially for reception of code or voice messages transmitted by radio communications services.

commutating poles. Small poles set between the main poles of a generator or motor to produce sparkless commutation.

commutation. In a dc generator, the process of changing the generated ac voltage to a pulsating dc voltage by means of a commutator and brushes.

commutator. A set of copper segments radially mounted on the armature shaft and connected to the armature coils of a dc motor or generator, with fixed brushes pressing against the commutator segments to provide connections to the armature coils.

compander. A circuit for either compressing or expanding the volume range.

compass. A small permanent magnet mounted so it can rotate freely. It will line up with the earth's magnetic lines of force, and point toward the north and south magnetic poles.

compatibility. Ability of a color television transmission system to provide color service for color receivers, and at the same time produce monochrome pictures on existing black-and-

white receivers without modification of these receivers.

compensated amplifier. An amplifier with a frequency response adjusted to fit a special need.

compensated attenuator. An attenuator with associated resistors and condensers, arranged to obtain or maintain a required frequency response while the amplitude is being varied.

complementary angle. Either of two angles whose sum is 90° .

complementary colors. Two colors of light, which, when properly combined, produce white light. Yellow and blue are complementary colors.

complex number. An expression consisting of a real number plus or minus an imaginary number. Examples: $R + jx$; $7 - j16$. The value following j is the imaginary component.

compliance. A measure of the ability of an object to give or stretch when a force is applied, equivalent in a mechanical system to capacity in an electrical system. Usually used in radio in referring to the springiness of a loudspeaker moving system.

component. Any part of a whole considered by itself. Examples: the ac portion of a pulsating current; any of the resistors, condensers, or other parts of a receiver.

components of a vector. The distances which determine the position of a vector with respect to reference lines. The horizontal component is the projection of the vector upon a horizontal line, and is equal to the magnitude of the vector multiplied by the cosine of the angle which the vector makes with the horizontal. The vertical component is the projection of the vector upon the vertical line, and is equal to the magnitude of the vector multiplied by the sine of the angle that the vector makes with the horizontal.

composite signal. The complete television signal containing the picture information and the synchronizing and blanking pulses.

composite sync signal. The portion of the television signal consisting of the horizontal, vertical, and equalizing pulses.

compound. A combination of two or more elements.

compound winding. A two-section field winding for a motor or generator, one section in series and the other in parallel with the armature.

compression. Squeezing together, as in limiting the audio-frequency response of a device to a certain portion of the normal frequency range, or of limiting the volume to a certain level. Also, a dense region of air caused by a vibrating body.

concave lens. A lens with one surface curved inward. If the other surface is flat, it is called a plano-concave lens; if both surfaces curve inward, it is called a double-concave lens.

concave mirror. A polished reflecting surface curving inward like the inside surface of a sphere or ball.

concavo-convex lens. A lens that curves inward on one side and outward on the other side.

concentric. Having a common center.

concentric cable. Coaxial cable.

concentric line. A coaxial cable.

concentric-line oscillator. An oscillator whose grid and/or plate tank inductances are formed

by the elements of a concentric line. Used in ultra-high-frequency work.

condensations and rarefactions. Periodic increases and decreases in air pressure resulting from the pulsation or vibration of some sound source. The condensations and rarefactions traveling outward from the source constitute a sound wave.

condenser. Two conducting surfaces separated by an insulating material, such as air, oil, paper, ceramic, or mica. A condenser is capable of storing electric energy, and is used to block the flow of direct current while allowing alternating and pulsating currents to pass. The electrical size or *capacity* of a condenser is specified in microfarads and micro-microfarads.

condenser bank. A number of by-pass or filter condensers in a single container.

condenser gang. A number of variable condensers operated from the same shaft.

condenser loudspeaker. A loudspeaker in which the mechanical forces moving the diaphragm result from electrostatic interactions of two large, closely spaced plates when a varying signal voltage is applied to the plates.

condenser microphone. A microphone consisting essentially of a flexible metal diaphragm and a rigid metal plate arranged to form a two-plate condenser. Sound waves set the diaphragm in vibration, varying the capacity, which in turn causes a varying current flow from the source of charging voltage.

condenser, voltage-regulating. A condenser, usually of the wet electrolytic type, used in a circuit to limit voltage rises by placing a load on the circuit if the voltage goes too high.

conductance (G). The characteristic of a body that allows electricity to flow through it. The unit of conductance is the mho. Conductance is the reciprocal of resistance; that is, when resistance is lowered, the conductance is proportionally increased.

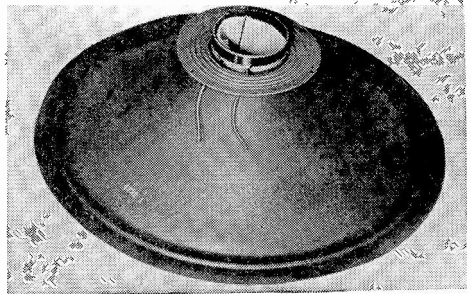
conduction current. A current formed by movements of electrons only (not ions).

conductivity. The conductance of a unit cube of a material.

conductor. A material that offers little opposition to the flow of electric current. A wire or metal structure that provides a path for electric current between two points.

conduit. A metal pipe through which electrical conductors are run.

cone. The conical-shaped paper or fiber diaphragm of a magnetic or dynamic loudspeaker.



Courtesy Jensen

Cone

- cone of silence.** The area directly over the antenna of a radio beacon transmitting antenna, in which no signal can be picked up.
- confetti.** The effect of random noise on the reproduced picture in color TV. Corresponds to snow on a black-and-white picture.
- conical antenna.** An antenna consisting of two cones, placed apex to apex, or two pairs of wires arranged in a flattened X to resemble the outlines of such cones.
- conical horn.** A cone-shaped horn, having a radius that increases uniformly along the axis of the horn.
- connector.** Any device that joins or couples two or more parts.
- console.** A large receiver cabinet designed to rest on the floor rather than on a table. Also, the desk on which are mounted the controls of a transmitter.
- constant.** A quantity expressing a value that does not vary.
- constant-amplitude recording.** A recording in which signals having the same power are inscribed at the same amplitude regardless of frequency.
- Constantan.** An alloy of approximately 60% copper and 40% nickel, used in the construction of precision resistors, rheostats, and measuring instruments.
- constant-current generator.** A tube circuit in which the ac plate resistance is high compared to the plate load resistance, with the result that the current is practically independent of load variations.
- constant-current modulation.** Amplitude modulation in which the output circuits of the modulator and the modulated amplifier are coupled by a common inductor that has high impedance to the signal frequencies and which, therefore, maintains the common plate supply current of the two circuits constant. The signal-frequency voltage appearing across the common inductor appears also as modulation of the plate supply to the modulated amplifier with corresponding modulation of the carrier output.
- constant-current transformer.** A transformer designed so that the current at the secondary remains constant under varying loads when a constant voltage is supplied to the primary.
- constant-velocity recording.** A recording in which the amplitude of the cut in the record is inversely proportional to the frequency in order to hold the vibrational velocity constant.
- constant-voltage transformer.** A transformer delivering a fixed voltage regardless of input voltage variations over a limited range.
- contact.** A terminal to which a connection can be made. A junction of conductors to permit the flow of electrical current.
- contact emf.** See *contact potential*.
- contact microphone.** A microphone designed to pick up mechanical vibrations directly and convert them into electrical impulses.
- contact potential.** A small voltage that is established whenever two conductors of different materials are brought into contact. It is due to the difference in work functions or the ease with which electrons can cross the surface boundary in the two directions.
- contact rectifier.** Two different solids in contact, in which rectification is due to greater conductivity across the contact in one direction than in the other.
- contact resistance.** The ohmic resistance between the contacts on a switch or relay.
- Continental Code.** The *International Morse Code*.
- continuity.** The property of having a continuous or complete dc electrical path.
- continuous duty rating.** Classification of a part, indicating the conditions under which it is capable of uninterrupted use or operation.
- continuous spectrum.** A spectrum whose components are continuously distributed over a frequency region.
- continuous wave (cw).** A radio wave in which successive cycles are identical (constant in amplitude) under steady-state conditions.
- contrast.** The range in light values between the brightest and the darkest elements in a picture.
- contrast control.** An adjustment for increasing or decreasing the range of light intensities of an image by varying the amplitude of the picture signal. Contrast control in the television receiver corresponds to gain control in a sound receiver.
- control characteristic.** A relation, usually shown by a graph, between the critical grid voltage and the anode voltage in a gas-filled tube.
- control electrode.** An electrode to which a varying voltage is applied for the purpose of varying the current flowing between two or more other electrodes in a vacuum tube.
- control grid.** That electrode in a vacuum tube which has the most effective control over the plate current passed by the tube.
- controlled carrier modulation.** Compound modulation in which the carrier amplitude is varied in accordance with the degree of modulation as averaged over a short period of time. When the modulation is small, the carrier amplitude is small, but when the modulation is increased, the carrier is increased accordingly, so that the percentage of modulation, or modulation factor, remains relatively constant regardless of the amplitude of the signal.
- control room.** A room in a station, from which the engineers and production men monitor and control the program, usually partly or completely enclosed in glass and located next to the main studio.
- convection current.** A current in which the electricity is carried by masses heavier than electrons (ions).
- converge.** To bring together, as to focus light rays or radio waves to a single point.
- convergent beam.** A beam of light whose rays meet (converge) at a single point.
- conversion transconductance.** The ratio of the desired beat frequency component of the plate current to the signal voltage applied to the grid.
- converter.** The section of a superheterodyne radio receiver that changes incoming modulated rf signals to a lower frequency known as the *i-f* value. Also, a device, usually rotary, for changing electrical energy from one form to another, as ac to dc. Also, a device for changing the frequency of incoming signals to values that can be tuned in by the receiver.
- converter noise.** Noise generated in the mixer-first detector of a superheterodyne receiver.

convex lens. A lens with one surface curved outward. If the other surface is flat, it is called a plano-convex lens; if both surfaces curve outward, it is called a double-convex lens.

convex mirror. A polished reflecting surface curving outward like the outside of a sphere.

coordinate. Any of two or more magnitudes that determine the position of a point with respect to reference lines. Ordinary graphs use rectangular coordinates, in which the horizontal reference line is called the X axis or the axis of abscissa, and the vertical reference line is called the Y axis or the axis of ordinates. In polar coordinates, position is determined with one vector magnitude and the angle the vector makes with the horizontal reference line or X axis.

copper. A metallic element widely used in electrical equipment. It is one of the best conductors of both electricity and heat.

copper-oxide rectifier. A rectifier made up of discs of copper coated on one side with cuprous oxide. The discs allow current to flow in one direction but allow very little current flow in the reverse direction.

copper-oxide rectifier-type meter. An instrument for measuring ac voltages and currents, using a copper-oxide rectifier to convert ac to dc to actuate a dc-indicating d'Arsonval type meter.

cord. A highly flexible wire, usually stranded, and insulated to withstand wear.

core. The material or space about which a coil is wound; by extension, the material through which flows the major portion of the magnetic flux.

core losses. The losses in an iron-core coil or transformer due to eddy currents and hysteresis in the iron core.

corona. The discharge of electricity that appears on the surface of a conductor as a glow of colored light when the potential gradient (voltage per unit length) exceeds a certain value. It is due to ionization of surrounding air by the high voltage.

corrosion. A chemical action, oxidation or rusting, which causes a gradual wearing away of metal.

corrugated. Having a surface with alternate valleys and ridges.

cosecant (csc). A trigonometric function. The cosecant of an acute angle of a right triangle (written $\csc \theta$) is equal to the hypotenuse divided by the opposite side.

cosine (cos). A trigonometric function. The cosine of an acute angle of a right triangle (written $\cos \theta$) is equal to the adjacent side divided by the hypotenuse.

cosmic rays. Rays originating outside the earth's atmosphere, having extremely high frequency and penetrating power.

cotangent (cot). A trigonometric function. The cotangent of an acute angle of a right triangle (written $\cot \theta$) is equal to the adjacent side divided by the opposite side.

coulomb. A unit of measure of the quantity of electricity that passes a given point at a given time. A coulomb is the quantity that is transferred by a current of one ampere flowing for one second, which involves a movement of 6.3 million, million electrons past a point in the circuit.

Coulomb's Law. The force of attraction or repulsion between two charges (or magnetic poles)

is directly proportional to the product of the charges (or pole strengths), inversely proportional to the square of the distance between them, and is modified by the dielectric constant (permeability) of the material between them.

counter. A frequency divider used to reduce the number of pulses to an amount capable of being handled by some mechanical counting device.

counterbore. To drill a cylindrical, flat-bottomed hole for receiving the head of a screw so that it will be flush with or below the surface of the work.

counter-clockwise. In a direction opposite that in which the hands of a clock rotate.

counter emf. See *back electromotive force*.

counterpoise. A system of wires directly below a transmitting antenna, insulated from and replacing the ground where the ground conductivity is poor or where the terrain prevents the use of sunken wires.

countersink. To ream, drill, or cut a conical depression around a hole for a flat-head screw, so that the screw head will be flush with or below the surface of the work.

counting circuit. See *counter*.

coupled circuits. Separate circuits that are made to influence one another.

coupler. An inductive, capacitive, or resistive device used to transfer electric power from one circuit to another.

coupling. The means by which signals are transferred from one radio circuit to another. Coupling can be direct through a conductor, electrostatic through a condenser, or inductive through a transformer. Optimum coupling or critical coupling is that which gives maximum transfer of signal energy. Tight coupling is the closest possible coupling under a given set of conditions. Loose or poor coupling gives little transfer of signal energy. Also a device for connecting two shafts together end to end.

coupling coefficient. A numerical rating between 0 and 1, specifying the degree of coupling between two circuits. Perfect coupling is 1, and no coupling is 0. For inductive coupling, the coupling coefficient is equal to $M \div \sqrt{L_1 L_2}$, where M is the mutual inductance in henrys, and L_1 and L_2 are the inductance values in henrys of the individual coils.

coupling condenser. A condenser used to couple two circuits together.

coupling transformer. A transformer used to couple two circuits together by means of mutual induction.

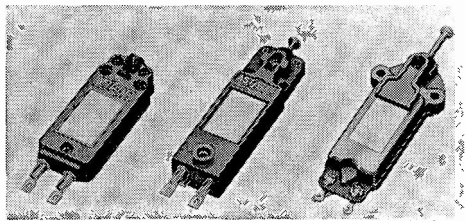
C power supply. Any power-supply device connected between the cathode and grid of a vacuum tube so as to apply a grid bias, such as a C battery or grid bias cell.

crater. The cavity formed in the positive carbon electrode of an electric arc. The highest light intensity is emitted in the region of the crater.

crater lamp. A neon lamp having a cup-shaped light source, providing a spot source of light.

critical angle. The angle of incidence beyond which rays of light are no longer refracted (bent) into a transparent medium, but are totally reflected from its surface.

critical coupling. Coupling that produces maximum transfer of energy.



Courtesy Astatic Corp.

Crystal Cartridges

critical damping. Introduction into a series LC circuit of that value of R that will cause a transient to die out within a half cycle, without producing oscillations.

critical grid voltage. That value of voltage on the grid of a thyratron which, if increased slightly in the positive direction, will cause the tube to fire.

critical viewing distance. The distance at which the fine structure of a television image becomes indiscernible.

crocodile clip. A long-nosed clamp with spring-controlled jaws, one of which is smaller than the other so that the teeth do not mesh, used on test leads for making quick, temporary connections.

cross modulation. A type of station interference (intermodulation) in which the carrier of a desired signal becomes modulated with an undesired signal, so that the undesired signal is heard.

cross neutralization. A method of neutralization used in push-pull amplifiers whereby part of the plate-cathode ac voltage of each tube is applied through a neutralizing capacitor to the grid-cathode circuit of the other tube.

cross-over area. In an electron gun, a region in the first lens system where emitted electrons are brought together under the influence of electric (and sometimes magnetic) fields.

cross-over frequency. The frequency where the output from a low-frequency speaker and a high-frequency speaker are equal. Below this point, the output is primarily from the low-frequency speaker; above it the output is from the high-frequency speaker.

cross-over network. A circuit used to divide the high and low frequencies for application to a dual loudspeaker system.

cross-over point. The point at which converging light rays or electron beams cross and begin to diverge.

cross-section. The area of that part of an object that is contained in any plane at right angles to the object length.

cross-talk. Audio-frequency interference existing between adjacent telephone lines. Also, cross-modulation.

cruciform core. A type of transformer core having the primary and secondary windings on a central core, with four separate magnetic return paths.

crystal. A piece of natural quartz or similar piezoelectric material that when set into vibration will generate a voltage at a desired radio frequency. A quartz crystal is used in radio transmitters to generate the assigned carrier frequency of a station, and in filters of radio receivers to improve the selectivity of the i-f amplifier. Also, the mineral used in a crystal detector is known as a crystal.

crystal cartridge. A case or shell containing a piezoelectric crystal, usually of Rochelle salt, used in a phonograph pickup to convert mechanical movement of the needle into electric energy.

crystal control. Use of a quartz crystal to maintain operation of a radio station at its assigned frequency within the limits prescribed by law.

crystal-controlled transmitter. A transmitter whose carrier frequency is directly controlled by the electro-mechanical characteristics of a crystal.

crystal detector. A detector consisting of a crystal such as silicon, germanium, or galena in contact with a pointed wire.

crystal filter. A highly selective tuning circuit using a quartz crystal, sometimes used in the i-f amplifier of a communications receiver to improve selectivity.

crystal holder. A device to hold a quartz crystal in a definite position and provide proper electrical contacts for it. Some holders have a variable air gap so the frequency of oscillation can be varied over a limited range.

crystal loudspeaker. A loudspeaker in which the mechanical forces acting on the diaphragm result from the vibration of a crystal element.

crystal microphone. A microphone in which changes in the shape of a piezoelectric crystal caused by sound waves generate the output voltage.

crystal oscillator. A vacuum-tube oscillator stage whose frequency is determined by a piezoelectric (quartz) crystal.

crystal oven. A small electrically heated oven in which the quartz crystal of a transmitter is mounted. The oven and crystal are kept at essentially constant temperature by automatic temperature controls to prevent frequency drift with temperature change.

crystal pickup. A phonograph pickup in which changes in the shape of a piezoelectric crystal by movements of the phonograph needle generate the output voltage.

crystal set. A radio receiver using a crystal detector for signal rectification.

C supply. Grid-voltage supply.

cube. The third power of a number, obtained by using a number as a factor three times. Example: $3 \times 3 \times 3 = 27$, which is the cube or third power of 3.

cube root. A number which, when multiplied by itself three times, equals the given number. Examples: 3 is the cube root of 27; 5 is the cube root of 125. Cube root is indicated by a radical sign with 3 as the index number. Example: $\sqrt[3]{343}$.

current. The movement of electrons through a conductor. Current is measured in amperes, milliamperes, and microamperes.

current antinode. A point along a transmission line or antenna at which current is at a maximum.

current density. The amount of an electric current per unit cross-sectional area of a conductor.

current feed. A method of exciting a transmitting antenna by feeding current to it at a point of minimum impedance.

current feedback. A form of degeneration in

- which the feedback is proportional to the plate current.
- current-limiting resistor.** A resistor used in a circuit as a protective device against overload during voltage surges.
- current loop.** See *current antinode*.
- current node.** Any point in a transmission line or antenna that has zero current.
- current transformer.** A transformer connected into a high-current circuit to permit measurement. A meter is connected across the secondary winding, and is calibrated or read in terms of current flowing in the primary.
- curve.** The line on a graph that connects plotted points and shows the relationship of one variable to another.
- curvilinear cone.** A curved loudspeaker cone having the general form of a parabola, used to secure pure piston action. A para-cone.
- cushion socket.** A tube socket mounted on soft rubber or springs, so that vibration will not injure or affect the tube.
- cut.** Removal of spoken or musical material from a radio program script in order to fit the prescribed time. Also, a command telling the studio engineer to disconnect all microphones, so nothing more can go out on the air.
- cut-off.** In a vacuum tube, the grid-bias voltage value at which plate current ceases to flow. Also, in a selective circuit, the frequency above or below which an amplifier or circuit fails to respond. Also, the lowest frequency a wave guide can transmit.
- cut-off frequency.** That frequency in a filter, loudspeaker, or other system at which rapid, if not complete, attenuation takes place.
- cut-off voltage.** Negative grid bias at and beyond which plate current ceases to flow.
- cutout.** Any arrangement by which a circuit is automatically opened when the current flowing through it exceeds or drops below a certain set value. Usually an electromagnetic device like a relay.
- cutter.** In recording, the device that transforms electric energy into mechanical motion, which is then inscribed into the record by the stylus.
- cutting angle.** Angle between the vertical cutting face of the stylus and the record surface.
- cutting head.** That part of a sound recorder which cuts or embosses on a disc the irregular grooves corresponding to the wave form of the sounds being recorded.
- cutting stylus.** The tool that cuts the groove into a record during recording.
- cycle.** One complete round of a regularly recurring event. Specifically, of an alternating current, the rise from zero to a maximum in one direction, a return to zero, a rise to a maximum in the opposite direction, and another return to zero. The number of cycles occurring in one second is the frequency of an alternating current. The word cycle is commonly used to mean cycles per second, which is the measure of frequency.
- cyclotron.** An apparatus that uses electromagnetic and electrostatic means for imparting tremendously high speeds to electrified particles. Cyclotrons are used to bombard the nuclei of atoms so as to change atomic structure or artificially produce radioactivity.
- cylindrical antenna.** See *coaxial antenna*.
- cylindrical concave mirror.** A curved reflecting surface like the inside of half a cylinder, used to focus light rays to a line.
- cylindrical convex lens.** A long lens having one surface curved outward and the other one flat, used to focus light rays to a line.

D

- damped waves.** Radio waves that progressively decrease in amplitude during successive cycles.
- dampen the studio.** To increase the absorption of sound in a studio by using sound-absorbing equipment such as monk's cloth screens, drapes, or rugs, or by bringing more people into the studio.
- damping.** Dissipation of energy in such a way that oscillations or vibrations die out rapidly.
- damping tube.** In television, a tube connected across the horizontal deflection coils to cut off shock-excited oscillations when the magnetic field collapses.
- dark spot defect.** Dark areas in the reproduced television image caused by electron clouds in front of the mosaic screen in the camera tube at the transmitter.
- d'Arsonval meter movement.** The meter movement most commonly used in direct-current measuring instruments. It consists essentially of a small coil of wire supported on jeweled bearings between the poles of a permanent magnet, with a spiral spring holding the coil and the attached indicating pointer at the zero position on the meter scale. When the current to be measured is sent through this coil, the magnetic fields of the coil and magnet interact to cause rotation of the coil and pointer.
- db meter.** An ac voltmeter designed for use across a specific impedance, whose scale is calibrated to read decibel values. Used with audio amplifiers particularly to indicate volume level in broadcast and public address work.
- dc amplifier.** A direct-coupled signal amplifier that will pass the dc component along with ac.
- dc component.** The part of the video signal caused by the average background illumination of the scene being televised. Also, the dc portion of any pulsating current.
- dc generator.** A rotating machine that converts mechanical energy into direct-current electric energy.
- dc inserter stage.** A television transmitter stage that introduces a dc component (the pedestal level) into the television signal. Synchronizing pulses then swing the signal in one direction from the pedestal level, while picture elements swing the signal in the other direction, thus making it possible to separate the two at the receiver.
- dc plate resistance.** The opposition to dc offered by the plate-cathode space of a vacuum tube, equal to the average or dc plate voltage divided by the average or dc plate current.
- dc receiver.** A receiver designed to operate from a dc power line, such as from the 110-volt dc lines still being used in older sections of some cities.
- dc reinserion.** The process of re-establishing the dc level or base line of a waveform, after it has been wiped out by ac-coupled video stages. Clamping.
- dc resistance.** The opposition offered by a circuit

or component to dc current flow, measured in ohms.

dc restoration. See *dc reinsertion*.

dc restorer. A circuit used to reinsert the dc component of the video signal lost during amplification. A clamper.

dc transmission. The transmission of a television signal with the direct current component in the picture signal.

dc voltage. A voltage that sends a direct current through a circuit, and hence forces electrons around the circuit in the same direction all the time.

deadbeat. Instruments whose pointers move to a position without undue oscillation and come to a dead stop. A highly damped meter movement.

dead-center position. The position in which a brush would be placed on the commutator of a dc motor or generator if there were no distortion of field flux by armature reaction.

dead end. The part of a radio studio that has the greatest sound absorption. Also the portion of a tapped coil through which no current is flowing.

dead receiver. A receiver that will not play.

dead spot. A region in which signals from certain stations are received poorly or not at all.

decade box. A system of series-connected resistors of such values that any desired amount of resistance from 1 ohm to the maximum of the system can be obtained in 1-ohm steps.

decay curve. A curve showing the rate of decrease in power, voltage, or current in a circuit in which energy is being dissipated.

deci. A prefix meaning one-tenth.

decibel (db). A unit for expressing a power ratio, equal to 10 times the common logarithm of the power ratio. One decibel is the amount by which the pressure of a pure sine-wave sound must be changed in order for the change to be just barely noticeable by the average human ear. A decibel can express an actual level only when some definite reference level is assumed to be zero db. With sound, the threshold of audibility is generally assumed to be zero db, and in public address work, a power of 0.006 watt is most generally used as the reference level of zero db. In broadcasting, 0.001 watt is used as the zero level.

decimal fraction. A proper fraction in which the denominator is some power of 10, usually expressed by a period (decimal point) placed at the left of the numerator.

decineper. One-tenth of a neper.

deck switch. A gang switch in which sets of contacts are arranged at different levels on insulating rings, with the contact points or fingers on discs attached to a shaft.

decoupling. Means taken to prevent coupling between stages or circuits of a stage.

decoupling circuit. A network of resistors or coils and capacitors used to separate and by-pass signals that would ordinarily flow in a common circuit.

decrement. The decrease in the value of a variable quantity.

de-emphasis. The reduction of some part of a signal, as the restoration of a pre-emphasized signal wave to its original form.

de-emphasis circuit. A circuit that reduces some part of a signal, as an R-C filter in an FM receiver that decreases to normal proportions those high audio frequencies that were emphasized in transmission to obtain a better signal-to-noise ratio.

definition. Clarity or degree of perfection of transmission and reception.

deflecting coil. A coil of wire used to control by electromagnetism means the movement of the electron beam in a cathode-ray tube in an oscilloscope, television camera, or television receiver. Also called a deflecting yoke.

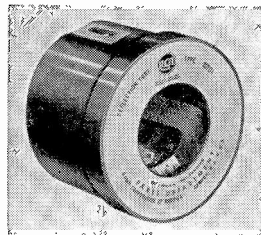
deflecting plates. Pairs of metal plates in an electrostatic cathode-ray tube to which potentials are applied to move the electron beam.

deflection. A movement of an object away from its normal position, such as deflection of a meter pointer or an electron beam in a cathode-ray tube.

deflection factor. In electrostatic-deflection tubes, the voltage required between a pair of deflection plates to produce unit deflection. Usually expressed in dc volts per inch. In magnetic-deflection tubes, the current required through a definite deflection yoke at a definite point on the tube to produce unit deflection. Usually expressed in milliamperes per inch.

deflection sensitivity. The beam deflection in a cathode-ray tube caused by a given change in the field intensity.

deflection yoke. An assembly consisting of the horizontal and vertical deflection coils of a magnetically deflected picture tube.



Deflection Yoke

Courtesy RCA

degaussing. Neutralizing the magnetic field, as of a ship so that if it passes over a magnetic mine, the striker on the mine will not act and the mine will not explode.

degeneration. The feeding back of an out-of-phase signal so that the effective amplification is reduced. Deliberately introduced in *inverse feedback* circuits because it reduces distortion.

de-ionization. Reversion of ions in a glow or arc to their original condition as neutral atoms and molecules.

de-ionization time. The time required for the grid of a gas tube to regain control after plate current has been interrupted.

delayed avc. An automatic volume control circuit that does not begin to act until signals reach a certain strength. It permits reception of weak signals even though they are fading, whereas normal avc tends to make weak signals weaker.

delta antenna-matching transformer. A means of matching the impedances of an open-wire transmission line and a half-wave antenna by spreading out the upper ends of the line and connecting them directly to the antenna to form a triangle like the Greek letter delta (Δ).

delta circuit. A network of three resistors or im-

pedances connected in the form of a triangle like the Greek letter delta (Δ).

delta connection. Connections forming a triangle like the Greek letter delta (Δ).

demodulation. The process of rectifying or detecting a modulated radio signal in order to remove the carrier and obtain the desired audio or picture signal.

denominator. The part of a fraction written below the line. Example: In $\frac{1}{2}$, the denominator is 2.

densitometer. An instrument used to measure the density or opacity of a material.

density. A measure of the concentration of matter in a material, in which case density is equal to weight divided by volume. Current density is the total current divided by the cross-sectional area of the conductor.

depolarization. Removal of the gases that form at the electrodes in a battery as a result of the chemical action involved in producing current.

depolarizer. The chemical used in a primary cell to reduce polarization by removing the hydrogen gas formed at the carbon electrode.

detection. The process of obtaining the desired intelligence from a modulated carrier. See *demodulation*. Also, frequency conversion as in a superheterodyne receiver.

detector. The stage in a receiver in which demodulation or detection takes place.

detent. A mechanism used on indexed rotary switches to hold the switch firmly in position. Generally consists of a spring-loaded ball that falls into place in indentations on a plate that rotates with the switch shaft.

detune. To change slightly the capacity, the inductance, or both in a tuned circuit, so that it no longer is in exact resonance at the applied frequency.

deviation, frequency. See *frequency deviation*.

deviation ratio. The ratio of maximum frequency deviation to the highest audio frequency in an FM signal.

diagram. A plan or layout for a receiver, transmitter, or other apparatus. In a schematic circuit diagram, schematic symbols represent radio parts. In a pictorial circuit diagram, actual sketches of radio parts are used. In a block diagram, entire circuits, stages, or sections are represented by labeled blocks.

dial. Any means for indicating the value to which a control knob has been adjusted.

dial cord. The braided cord or flexible wire cable used to make a tuning knob control the position of the pointer or dial that indicates the frequency or channel to which a receiver is tuned.

dial light. The pilot lamp that illuminates the tuning dial of a receiver.

diameter. A line passing through the center of a circle and ending at opposite points on the circle. The distance across, or width of the circle.

diaphragm. A thin, flexible sheet that can produce sound vibrations (as in a headphone) or can be moved by sound waves (as in a microphone). In photography and in television cameras, an adjustable device used to reduce the effective area of a lens so as to control the amount of light passed by the lens.

diathermy. Therapeutic use of a high-frequency

current to generate heat within the body. Diathermy machines are actually short-wave transmitters, and often cause serious radio and TV interference.

dichroic mirror. A glass surface treated with metallic salts that reflects only one color and permits all other colors to pass through the glass.

dielectric. The insulating material between two conductors. Specifically that between the plates of a condenser.

dielectric constant. The ratio of the capacity of a condenser using a given substance for a dielectric to the capacity of the same condenser with air for a dielectric.

dielectric loss. Energy loss in the form of heat in the dielectric of a capacitor, due to an action similar to hysteresis in a magnetic circuit.

dielectric strength. The voltage a dielectric of unit thickness can withstand without breaking down.

differentiating circuit. A *high-pass filter*. A circuit in which the voltage amplitude at the output is proportional at any instant to the rate of change of voltage amplitude at the input. Specifically, such a circuit used in a TV receiver to segregate the horizontal sync pulses from the vertical sync pulses after clipping.

diffraction. The spreading of an electromagnetic wave or light beam into the region behind an obstacle.

diffusion. Scattering of light or electromagnetic waves.

diheptal base. A 14-pin tube base used for cathode-ray tubes.

dimmer. A device by means of which lights may be gradually dimmed or brightened.

diode. A vacuum tube having two electrodes, one the cathode and the other the plate or anode.

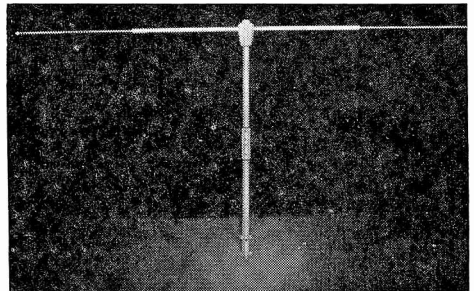
diode-pentode. A vacuum tube having a diode and a pentode in the same envelope.

diode-triode. A diode and a triode in the same tube envelope.

dioptr. A unit expressing the power of a lens, equal to the reciprocal of the focal length in meters.

diplexer. A coupling unit that allows two transmitters to operate simultaneously into the same antenna.

dipole. An object oppositely charged at two poles, especially an antenna shorter than a half wavelength. Loosely, an antenna whose length is approximately one half of the electromagnetic wavelength to which it is resonant.



Dipole

- direct-coupled amplifier.** An amplifier in which the stages are coupled without the use of condensers or transformers, so that there is a direct or dc path between the stages.
- direct current (dc).** An electric current that flows in only one direction, not necessarily constant in value.
- direct inductive coupling.** A method of coupling in which one circuit is connected directly to a tap on the inductance element of another circuit.
- directional antenna.** An antenna that radiates or receives radio waves better in some directions than others.
- directional pattern of an antenna.** A special graph (polar characteristic) that indicates the intensity of the radiation field of a transmitting antenna at a fixed distance in different directions in space. In the case of a receiving antenna, it indicates the response of the antenna from different directions to a signal having unit field intensity.
- direction finder (df).** A radio-receiving device used to determine the direction of the source of electromagnetic waves.
- direction-finder deviation.** The difference between the observed bearing and the true (corrected) bearing of a direction finder.
- direction of polarization.** The direction of the electric field component in an electromagnetic wave. For example, a vertically polarized wave is one having the electric field component in a vertical (up and down) plane with respect to the earth's surface.
- directly proportional.** Varying in the same direction as some other value. For example, if one increases, so does the other.
- director.** In a directional antenna system, the parasitic element in front of the antenna that increases the radiation or reception along a line passing through it to the antenna.
- direct scanning.** A system in which the entire subject is illuminated, and a scanning device is used in front of a light-sensitive cell to expose a limited area of the scene at a time.
- direct-view.** A television receiver in which the image is viewed on the face of the cathode-ray tube. Distinguished from the indirect-view or projection-type receiver, in which the image is optically projected from the cathode-ray tube to a special viewing screen.
- direct wave.** A wave propagated through space without being reflected.
- directivity.** The antenna characteristic that causes it to radiate or receive more power in certain directions than in others.
- disc.** A phonograph record or blank. Also, the rotating element of a mechanical television scanning system.
- discharge.** A release of stored energy from a condenser, or the drawing of current from a battery.
- discharge tube.** A tube so operated that it is normally cut off, but is made to conduct at periodic intervals.
- discriminator.** The stage of an FM receiver that converts FM signals directly into audio signals. Also, a similar stage in an automatic frequency control system that produces the control voltage.
- dispersion.** The separation of white light into its component colors, as in a prism. Also, the scattering of electromagnetic waves.
- dissector.** A pickup tube used in the television camera, more properly an *image dissector*.
- dissipation.** Energy expended in the form of heat in the resistive elements in or associated with a circuit.
- distortion.** Improper reproduction of sound or image because of changes occurring in the waveform of the intelligence signal somewhere in the path it takes through the transmitting and receiving systems or through an amplifier system.
- distress frequency.** The frequency allotted by international agreement to distress calls. For ships at sea and aircraft over the sea, it is 500 kilocycles.
- distress signal.** By code: SOS; by radiotelephone: "MAYDAY," from the French "M'Aider," meaning help me.
- distributed capacity.** Capacity distributed between conducting elements, as distinguished from capacity concentrated in a condenser. Usually, the small capacity existing between the turns of wire in a coil.
- distributed constants.** Constants that exist along the entire length or area of a circuit, such as distributed capacity or distributed inductance.
- distributed inductance.** The inductance that exists along the entire length of a conductor, as distinguished from self-inductance concentrated in coils.
- distribution.** The degree of linearity of scanning in a television system. When scanning is linear, distribution is good.
- distribution control.** The control that varies the amount of correction applied to the sawtooth wave in a television receiver so as to give the desired linear scanning of lines.
- divergent.** Spreading out from a point of origin, as of light rays or radio waves.
- divergent beam.** A beam of light whose rays spread out.
- diversity reception.** Reception of radio signals so as to overcome fading by means of two or more antennas separated by several wavelengths or differing in polarity.
- dividend.** A number or quantity that is to be divided. Example: In the expression $1400 \div 70 = 20$, the dividend is 1400. (The divisor here is 70, and the quotient is 20.)
- dividing network.** See *cross-over network*.
- division.** The process of finding how many times one number is contained in another. The standard sign that indicates division is \div . In algebra, a horizontal line (or sometimes a fraction bar) is used instead of the conventional division sign. Example: $E \div R$, $\frac{E}{R}$ and E/R all mean that E is to be divided by R. In dividing positive and negative numbers, the quotient is positive if both numbers have like signs, and the quotient is negative if the numbers have unlike signs.
- divisor.** The number by which a number or quantity is to be divided. Example: In $1400 \div 70 = 20$, the divisor is 70. (The dividend here is 1400, and the quotient is 20.)
- dog house.** The structure at the base of a transmitting antenna that houses the antenna tuning equipment.
- Doherty amplifier.** An amplifier circuit in which one tube supplies unmodulated carrier power, and a second tube, feeding the same load as

the first, is biased so no plate current flows until the rf grid voltage (modulated carrier signal) exceeds its bias. When this happens, the second tube feeds power to the load, and the effective impedance of the load is lowered. This results in an increase in power from the first tube.

dolly. A perambulator, or carriage upon which a camera is mounted.

doorknob tube. A doorknob-shaped tube designed for ultra-high-frequency work by the elimination of a base and reduction of interelectrode capacities.

doppler effect. An apparent change in the frequency of a sound or electromagnetic wave reaching an observer, due either to motion of the source toward or away from the observer, to motion of the observer, or both.

dot interlacing. A method of scanning in which alternate picture elements are scanned during each field. In color systems every third element is scanned in one color in one field.

dot sequential. In color TV, the process of scanning one picture element in one primary color, the next in another, and the third in the third color. By *dot interlacing* each element is scanned in a different color in different fields, so that when a complete frame has been scanned, each element has been scanned in all three colors. A similar system of scanning picture elements in some regular, repetitive pattern may be used in black and white TV.

double-button carbon microphone. A carbon microphone having two buttons or containers for carbon granules, one on each side of the diaphragm, to secure a push-pull action for increased signal output.

double-concave lens. A lens with both sides curved inward, so the center is the thinnest section.

double-convex lens. A lens with both sides curved outward, so that the center of the lens is the thickest portion.

double diode. Two diodes in the same tube envelope. A duodiode.

double-hump resonance. A condition in which two circuits normally resonant to the same frequency, are closely coupled, or are detuned so that they resonate to frequencies on either side of the original resonant point, thus producing a response curve having two humps.

double modulation. The process in which a carrier wave of one frequency is first modulated by the signal wave, and is then made to modulate a second carrier wave of higher frequency.

double-pole switch. A switch that simultaneously changes connections in two separate circuits or in both sides of the same circuit.

doubler. A vacuum-tube circuit in which the output signal is twice the frequency of the input signal. Also a *voltage-doubler*.

double sideband transmission. A system in which both sidebands, one on either side of the carrier, are transmitted. It is the standard broadcast transmission.

double-spot tuning. The condition in which there are two different points at which the tuning dial may be set to receive the same station.

double superheterodyne. A superhet in which frequency conversion occurs twice. It uses two first-detector stages and one or two local oscillators. A local oscillator signal is combined with the desired signal in the first first-detector to produce a preliminary i-f value, and this is combined in the second first-detector with the same or another local oscillator signal to pro-

duce the final i-f value. Used to get more gain and to stabilize operation at high frequencies.

doublet antenna. An antenna system, independent of the earth, usually a half wavelength long or some multiple of this length. The term is also used to describe a shorter antenna that should be called a dipole.

double-throw switch. A switch that connects one terminal to either of two other terminals.

double triode. Two triodes in the same tube envelope. A duotriode.

down lead. The wire connecting the antenna with the receiver. A lead-in.

downward modulation. Modulation in which the average amplitude of the output is less than the unmodulated carrier amplitude.

Dow oscillator. An electron-coupled oscillator circuit.

drain. The current being taken from a voltage source.

D region. The region of the ionosphere up to about 55 miles above the earth's surface.

dress. To arrange in an exact manner, as to position wires or parts so as to prevent or reduce undesired feedback.

drift. Detuning due to time, temperature, humidity, or other influences.

drift space. The space between the buncher and catcher grids in a Klystron in which the electrons actually bunch because of their differing velocities.

drive belt. A belt used to transmit power from the driving to the driven device.

drive holes. Holes spaced around the center hole of a recording disc to engage a drive pin in the turntable, preventing the disc from slipping during recording or playback.

driven element. Any antenna array element that receives power directly from the transmitter or is connected directly to the receiver.

drive pin. A pin located to one side of center on a phonograph turntable, sometimes used to prevent the record from slipping during recording or playback.

driver. The amplifier stage preceding the high-power output stage in a transmitter. It delivers power as well as voltage for excitation of the output stage.

drop. The voltage developed across a resistor due to current flow through the resistor.

dropping resistor. A resistor used to decrease the voltage in a circuit.

drop-out current. That value to which the current through a relay coil must be reduced before the armature will be released.

drum speed. The number of scanning lines per minute in a facsimile system.

drum switch. A series of contacts on a rotating drum that make contact with fingers fastened to an insulated support. Used for complex circuit changes.

dry battery. A group of dry cells connected in various series, parallel, or series-parallel arrangements to get desired voltage and current values.

dry cell. A type of primary cell in which the electrolyte is in the form of a paste rather than a liquid.

dry-disc rectifier. Dry contact rectifier. A rectifier consisting of discs of metal and other material in contact under pressure, such as a copper-oxide rectifier or a selenium rectifier.

dry electrolytic condenser. An electrolytic condenser in which the electrolyte is a paste rather than a liquid, to permit using the condenser in any position without danger of leakage of the electrolyte.

dual capacitor. Two capacitors in a single housing.

dual-diversity receiver. A radio receiver designed to receive signals from two different receiving antennas and use whichever signal is the stronger at any instant, in order to offset fading.

dub. To make a copy of a sound recording by a process of re-recording.

duct. An atmospheric phenomenon consisting of two layers between which electromagnetic waves are channeled and, as a result, reflected toward the earth at a greater range than normal.

dummy antenna. A resistor or other device that duplicates the electrical characteristics of a transmitting antenna without radiating radio waves. Used for testing and adjusting transmitters.

dummy load. A dissipative but essentially non-radiating device having the impedance characteristics of an antenna or transmission line.

duodiode. A vacuum tube having two diodes in the same envelope.

duodiode-pentode. A vacuum tube having two diodes and a pentode in the same envelope. Also called double-diode pentode.

duodiode-triode. A vacuum tube having two diodes and a triode in the same envelope. Also called duplex-diode triode.

duotriode. A vacuum tube having two triodes in the same envelope. Also called double triode.

duplex operation. Simultaneous transmission and reception of radio signals.

duralumin. An alloy of aluminum comparable in strength and hardness to soft steel.

duty factor. The product of the pulse duration and the pulse repetition rate. It represents the time in operation per second.

dynamic characteristic. A graph showing the operating conditions for a tube.

dynamic loudspeaker. A loudspeaker in which the diaphragm or cone is attached to a small coil that is mounted so that it can move within a constant magnetic field. Audio frequency currents flowing through this coil produce a varying field that interacts with the fixed field, causing the coil to move in and out, thereby causing the cone to reproduce sound waves.

dynamic microphone. A microphone having a moving coil mechanism similar to that in a dynamic loudspeaker. Sound waves move the diaphragm, causing the attached voice coil to move in and out of a fixed magnetic field produced by a permanent magnet. An audio output voltage is thus induced in the moving coil.

dynamic noise suppressor. Circuit for audio amplifiers, especially those for record players. The output at both ends of the frequency response is cut off until the signal level at these frequencies exceeds the threshold level, so as to block low or high frequency noises.

dynamo. An electric motor or generator.

dynamotor. A rotating device acting both as motor and generator, used to change a dc voltage to an ac voltage or to a higher dc voltage.

dynatron. A tube circuit arranged so that secondary emission from the plate causes plate current to decrease as plate voltage is increased.

dynatron oscillator. An oscillator in which energy is delivered to a tank circuit because the tube is made to have a negative resistance characteristic.

dyne. The cgs unit of physical force. A dyne is equal to 1/980th gram.

dyne per square centimeter. The unit of sound pressure. The term "bar" was formerly used to mean a sound pressure of one dyne per square centimeter, but the term is being dropped in acoustics.

dynode. An intermediate electrode between the cathode and plate of an electron-multiplier tube. The dynode emits many secondary electrons for each incident electron striking it.

E

eccentric groove. A blank endless groove provided on most phonograph records, whose center is other than that of the record. It actuates the tripping mechanism of an automatic record changer after the record has been played.

eccentric spiral. The blank spiral groove leading from the end of the recorded part of a phonograph record to the eccentric groove.

echo. A signal that has been reflected at one or more points in the transmission medium, so that it is received separately from the main transmission. A sound wave heard after reflection from one or more surfaces. *Ghost.*

echo area. The effective cross-sectional area of a radar target, resulting from scattering of the reflected beam.

echo chamber. A reverberant room used to add hollow effects and echoes to radio programs.

eddy current. Current induced in conducting materials by varying magnetic fields in such a way that power is dissipated within the conductor in the form of heat.

Edison base. The standard screw base used for ordinary electric light bulbs in the United States.

Edison cell. A storage battery using nickel and iron plates and an alkali electrolyte.

effective antenna length. The length which, when multiplied by the current at the point of maximum current, will give the same product as the length and uniform current of an elementary dipole antenna at the same location, and give the same radio field intensity in the direction of maximum radiation.

effective current. The value of alternating current that will cause the same heating effect as a given value of direct current. Also called the rms current.

effective height. An antenna rating, equal to the height of a perfect antenna giving the same field strength.

effective resistance. In an ac circuit, the average power dissipated divided by the square of the effective current.

effective radiated power. The power fed into the antenna multiplied by the antenna power gain.

effective value. The rms value of an alternating cycle of current, voltage, or power.

efficiency. The ratio of energy output to energy input, usually expressed as a percentage.

elasticity. The ability of a substance to return to shape after being stretched or otherwise deformed.

E layer. An ionized layer in the atmosphere, capable of reflecting or bending radio waves back to earth. The E region extends between about 55 and 85 miles above the earth's surface.

electralloy. A soft iron alloy used for radio chassis construction.

electret. A dielectric that retains a charge after the charging field is removed, much as a permanent magnet retains magnetism.

electrical angle. A *phase angle* expressed in degrees.

electrical bandspread. Tuning by means of a gang of low-capacity condensers connected in parallel with the main tuning gang of a short-wave receiver. After tuning to the desired band with the main gang, it is possible to "spread out" that band over the complete rotation of the bandspread dial because the small capacitances give a smaller frequency change per degree of rotation.

electrical center. The point approximately midway between the ends of an inductor or resistor that divides it into two equal electrical values, as to voltage, resistance, inductance, or number of turns.

electrical inertia. Inductance; opposition to change in current flow.

electrical interference. Interference caused by the operation of electrical apparatus other than radio stations. Also called man-made interference.

electrical transcription. A recording made expressly for broadcast purposes.

electric eye. A cathode-ray tuning-indicator tube used in some radio receiving sets. It consists of a fluorescent screen with a dark sector that varies in direct proportion to the strength of the incoming signal. Also, a popular name for a photoelectric cell.

electric field. A region or space traversed by electric lines of force.

electricity. A fundamental quantity in nature characterized by the fact that it gives rise to a field of force possessing potential energy, and that when moving in a stream (electric current) it gives rise to a magnetic field with which kinetic energy is associated.

electric lines of force. Imaginary lines used to designate the direction and amount of force produced by an electric charge.

electric organ. A musical instrument using electrical devices instead of wind to produce tones similar to those of a pipe organ.

electro-acoustic. Pertaining to a device whose functions involve both electric current and sound-frequency pressures.

electrochemical recording. Recording by means of a chemical reaction brought about by the passage of signal-controlled current through the sensitized portion of the record sheet of a facsimile receiver.

electrode. An essential part inside a vacuum tube, such as the cathode, the various grids, and the plate. Also, the plates of a primary cell, secondary cell, or electrolytic condenser, or the carbons of an arc.

electrode current. The current passing to or from an electrode, particularly that through the space inside a vacuum tube.

electrode dissipation. Power dissipated as heat by a vacuum-tube electrode as a result of electron and/or ion bombardment.

electrode voltage. The voltage applied between another electrode and the cathode in a vacuum tube.

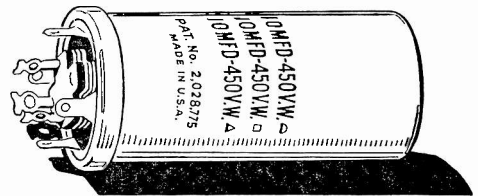
electrodynamical loudspeaker. A dynamic loudspeaker in which the magnetic field is produced by an electromagnet.

electrodynamometer. An instrument having two coils, arranged so the interaction of their fields actuates an indicator, used to measure dc and low-frequency ac currents.

electrolysis. Corrosion caused by a current flowing in and out of the surface of a conductor when resistance develops in a joint in the normal current path, or conductivity develops in adjoining insulation. Chemical decomposition by the action of an electric current.

electrolyte. The chemical liquid or paste used between the electrodes of a dry cell, storage battery, or electrolytic condenser.

electrolytic cell. A cell containing two electrodes, used to dissociate an electrolyte into its components.



Electrolytic Condenser

electrolytic condenser. A fixed condenser containing a liquid or paste electrolyte, in which the dielectric is a thin film formed on the surface of one electrode.

electromagnet. A core of magnetic material, surrounded by a coil, and magnetized by a current flowing through the coil.

electromagnetic deflection. The process of bending or altering the path of an electron stream by means of a magnetic field created by the passage of current through coils.

electromagnetic field. The combined electric and magnetic fields produced by the flow of electrons through a wire or coil.

electromagnetic induction. The action that causes a voltage to be induced in a conductor when the number of magnetic lines of force linking with the conductor is changed.

electromagnetic units (emu). A system of electrical units of measurement, derived from basic cgs units, assuming the magnetic permeability of air as 1.

electromagnetic wave. A wave in which there are both electric and magnetic fields, at right angles to each other. Electromagnetic waves are known as radio waves, infra-red rays, light, x-rays, etc., depending on the frequency.

electromagnetism. Magnetic effects produced by electric currents.

electromechanical. Pertaining to a combination of mechanical and electric forces.

electromechanical recording. Facsimile recording by means of a signal-actuated mechanical device.

electromotive force (emf). The force causing motion of electrons. Voltage.

electron. The elementary particle of negative electricity. Some electrons are closely associated with atoms of matter; others, called free electrons, move readily between atoms under the influence of electric or magnetic fields, or are emitted under the influence of heat. The movement of electrons through a conductor constitutes an electric current.

electron beam. A stream of electrons, such as in a cathode-ray tube or in a klystron.

electron-coupled oscillator. An oscillator circuit using a screen-grid or pentode tube in which the oscillator transfers energy to the output circuit through the stream of electrons from the cathode, instead of through direct coupling.

electron coupling. A method of coupling in which an electron stream transfers energy from the anode grid of the oscillator to the plate load circuit.

electron drift. The actual movement of electrons when current flows.

electron emission. The release of electrons from the surface of a material into surrounding space due to heat, light, high voltage, or other causes.

electron focus. Use of an electrostatic or electromagnetic field to converge the electron beam in a cathode-ray tube to a small spot on the screen.

electron gun. The part of a cathode-ray tube that includes the electron-emitting cathode and the associated parts that concentrate and control the stream of electrons.

electronic control. The control of a machine or device by apparatus using electron tubes.

electronic key. A circuit that automatically produces dots and dashes of uniform size.

electronic keying. A method of telegraphic keying in which the keyed stage is controlled by a tube that in turn is made to function by a manually operated key.

electronic lens. An arrangement of electrodes and/or magnetic deflecting and focusing coils used to control the direction and size of a beam of electrons.

electronic optics. That branch of electronics dealing with the control of the movements of electrons by the application of electrostatic and electromagnetic forces.

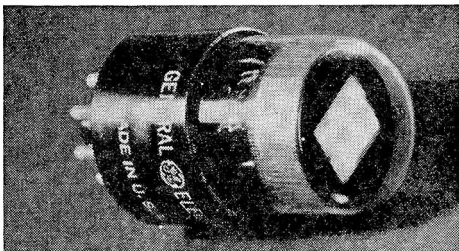
electronics. The branch of science relating to the conduction of electricity through gases or in a vacuum.

electronic television. A television system in which the scene to be transmitted is scanned and re-constructed by electron beams in cathode-ray tubes, rather than by mechanical means.

electron microscope. A device that directs a beam of electrons on the object being examined, magnifies the resulting shadow, and makes this shadow visible on a fluorescent screen or records it on photographic film.

electron-multiplier tube. A vacuum tube designed so that the initial electron current produced by a thermionic or light-sensitive cathode causes secondary emission from a number of dynodes. Each time a dynode is struck by an electron stream, the secondary electrons combine with the electron stream, which in turn produces more secondary emission from the next dynode.

The electron current arriving at the anode is the sum of the individual secondary emission currents and the initial cathode current.



Electron Ray Tuning Indicator

Courtesy GE

electron-ray tuning indicator. A vacuum tube with a fluorescent screen, used in receivers to indicate when a station is tuned in accurately.

electron tube. Any partly evacuated, completely evacuated, or gas-filled tube used to control the flow of electrons in a circuit. Vacuum tubes, phototubes, mercury-vapor rectifier tubes, and cathode-ray tubes are all electron tubes.

electron volt. The energy possessed by an electron that has undergone a change of potential of one volt.

electroplating. A process for applying a coating of metal to a conductive surface by means of an electric current.

electroscope. An instrument for detecting static charges of electricity.

electrostatic. Pertaining to static electricity, charges, and potential differences.

electrostatic charge. An electric charge in a capacitor or on the surface of an insulated object.

electrostatic coupling. The coupling of two circuits by a capacity, so that one circuit influences the other through condenser charges and discharges.

electrostatic deflection. The process of bending the electron stream in a cathode-ray tube by the use of an electrostatic field.

electrostatic field. See *electric field*.

electrostatic focusing. Focusing of an electron beam in a cathode-ray tube by the action of an electric field.

electrostatic induction. Accumulation of an induced charge on a conductor as a result of placing a charge in the vicinity. If a negative charge is brought near an uncharged conductor, electrons in the conductor will recede, producing an induced positive charge.

electrostatic scanning. The deflection of an electron beam to form a raster by means of an electrostatic field.

electrostatic shield. A grounded piece of metal or a grille consisting of vertical or horizontal wires but not both, used to prevent an electric field from transferring energy. See *Faraday shield*.

electrostatic units (esu). A system of electrical units of measurement, derived from basic cgs units, assuming the dielectric coefficient of air as 1.

electrostatic voltmeter. A voltmeter that operates on the principle that two like charged bodies will repel each other. Such a voltmeter has two plates opposite each other, one free to move.

As the voltage applied to the plates is increased, the movement increases, and a pointer connected to the movable plate indicates the voltage applied.

electrothermal recording. The type of electrochemical facsimile recording in which the chemical change is produced principally by heat.

element. One of the known basic forms of matter that make up the universe. Also the component parts of a device; thus, the cathode, grid, and plate would be called the elements of a triode vacuum tube.

elemental area. In television and facsimile, a square segment of a scanning line, the length of which is equal to the nominal line width.

eliminator. A device that replaces batteries as a source of current and voltage.

elliptically polarized wave. A wave in which the direction of displacement rotates around an axis, and the magnitude of displacement varies as the radius of an ellipse.

embossed recording. A method of sound recording on discs or film by mechanical pressure. Modulation grooves are formed by pressure displacement of the recording base material, instead of by cutting out the material.

emission. Giving off of electrons. Also, the radiation of energy into space as from an antenna.

emission characteristic. A relation, usually shown by a graph, between electron emission and some factor controlling the emission, such as the temperature, voltage, or current of the filament or heater.

emission efficiency. The amount of electron emission from a cathode per watt of heating power.

emission types. A classification of kinds of radio transmission, adopted by international agreement, in which the type of modulation, type of transmission, and supplementary characteristics are represented by symbols. For example, A5 represents amplitude modulation, television; F3 represents frequency modulation, telephony (broadcasting); P3e represents pulse modulation, telephony, width modulated.

emission velocity. The initial velocity with which electrons emerge from a cathode surface.

emitron. Term applied to one British version of a television camera tube.

emphasizer. A series of components connected in a circuit to increase signal amplitude at certain audio frequencies.

empirical. Based on experience or observation.

enameled wire. Wire coated with an insulating layer of baked enamel.

end effect. The effect of capacitance at the ends of an antenna. Also, the effect of inductance at the end of a coil.

end-fire antenna array. An array in which the elements are side by side, parallel, and all lying in the same horizontal plane.

energy. Ability to do work.

envelope. Two curves, one drawn through the negative, and the other through the positive peaks of a graph of the wave form of an rf signal. Also the glass or metal housing of a tube.

E plane. The plane of an antenna in which the electric field lies, perpendicular to the H plane.

equalizer. A part or circuit used to produce a flat electrical or acoustical frequency response over a desired frequency range, or for changing the response to satisfy particular requirements.

equalizing pulses. A series of pulses occurring at twice the horizontal frequency, placed before and after each vertical sync pulse, and used to maintain proper horizontal sweep control in a television system.

equation. A mathematical statement that two numbers, quantities, or expressions are equal. Examples: $P = EI$; $7^2 = 49$; $(a + b)^2 = a^2 + 2ab + b^2$. A formula is an equation because it involves equality, but an equation is a formula only when it expresses a scientific fact, law, or principle.

equipotential line. An imaginary line in space along which all points have the same potential.

equisignal radio-range beacon. A radio-beacon station that transmits two distinctive signals, these being received with equal intensity only along certain paths that constitute the route for airplanes.

equisignal sector. The on-course region in which the two different signals from an equisignal radio-range beacon are received with equal intensity.

equivalent circuit. An arrangement of resistors, coils, and condensers to simulate or electrically replace a more complicated circuit, to permit analysis.

equivalent loudness level. The intensity level in decibels of a 1000-cycle pure tone equivalent in loudness to the sound under consideration.

equivalent plate voltage. A theoretical voltage in the plate circuit equal to the ac grid voltage multiplied by the amplification factor of the tube.

equivalent resistance. A lumped or concentrated resistance that would cause the same loss as smaller resistance values distributed throughout an entire part or circuit. Used chiefly for convenience in computations or for determining circuit actions.

E region. The region of the ionosphere between about 55 and 100 miles above the earth's surface.

erg. The basic unit of work in the cgs system. The work done by a force of one dyne acting through a distance of one centimeter.

escutcheon. The ornamental wood, metal, or plastic framework for a dial, tuning indicator, or other panel-mounted part in a receiver or amplifier.

ether. The medium that was once supposed to fill all space, and through which radio, heat, and light waves were supposed to travel.

E waves. Electric field waves.

excitation. Application of a signal to the input of an amplifier stage, or application of signal power to a transmitting antenna. Also, application of voltage to the field coils of a motor or generator, or to the field coil of an electrodynamic loudspeaker.

excitation anode. Auxiliary starting electrode of a mercury arc rectifier.

exciter. In a directional transmitting antenna system, the part directly connected to the transmitter. In a transmitter, the exciter is the crystal oscillator or self-excited oscillator that generates the carrier frequency. Also, the small auxiliary generator used to provide field excitation for some large generators.

exciting current. The current that flows through the primary winding of a power transformer when there is no load connected to any secondary winding.

expansion. Widening the volume range of an audio-frequency signal so that weak passages become weaker and loud passages become louder. Volume expansion.

exploring coil. A small coil used in measuring a magnetic field.

exponent. A number written at the right of and slightly above another number to indicate how many times the number is to be multiplied by itself. The result is the power of the number. Examples: 5^4 means $5 \times 5 \times 5 \times 5$, and is pronounced "5 to the fourth power." The result, 625, is the fourth power of 5. 1^2 means 1×1 , and is pronounced "1 squared" or "1 to the second power." A negative exponent means to find the reciprocal of the number with a positive exponent. Example:

$$b^{-3} = \frac{1}{b^3}$$

A fractional exponent indicates the root of a quantity. Example:

$$x^{\frac{1}{2}} \text{ means } \sqrt{x}; x^{\frac{1}{3}} \text{ means } \sqrt[3]{x}; x^{\frac{5}{8}} \text{ means } \sqrt[8]{x^5}.$$

exponential horn. A loudspeaker horn whose cross-sectional area varies exponentially with its length.

extended cut-off. See *remote cut-off tube*.

extinction potential. The lowest value to which the plate voltage of a gaseous triode can be reduced, without stopping the flow of plate current.

extraordinary wave. One of two components into which a radio wave is split in the ionosphere by the earth's magnetic field. Sometimes called the X wave. The other component is the ordinary wave.

F

facsimile. The process of transmitting and reproducing photographs, drawings, handwriting, sketches, and printed matter of any kind by means of a radio or wire communication system. "Type A facsimile" is a system in which images are built up of lines of dots of constant intensity. "Type B facsimile" (telephotography, photoradio, etc.) is a system in which images are built up of lines or dots of varying intensity.

facsimile receiver. The apparatus that translates the signal from the facsimile communication channel into a facsimile record of the subject copy.

facsimile recorder. The part of a facsimile receiver in which the picture signal is registered upon a paper record sheet.

facsimile transmission. The transmission of signal waves produced by scanning fixed graphic material.

facsimile transmitter. The apparatus used to translate pictures and other subject copy into signals to be transmitted.

factor. If two or more numbers are multiplied together, each of them, or the product of any combination of them, is a factor of the product. Example: 2, x, y, 2x, 2y, and xy are all factors of 2xy.

fade. To change gradually. A program is faded in by making it gradually louder or brighter, and is faded out by diminishing its volume or brilliance gradually to zero.

fadeout. Intentional, gradual disappearance of a movie or television scene prior to showing a different scene. Also, the failure of radio waves to arrive at a location because of magnetic storms or atmospheric disturbances.

fader. A device for electrically fading a program in or out. Also, a control that gradually reduces the volume of one signal while gradually increasing the volume of another signal.

fading. A variation in the intensity of received signals because of changes in atmospheric conditions along the path between the transmitter and the receiver.

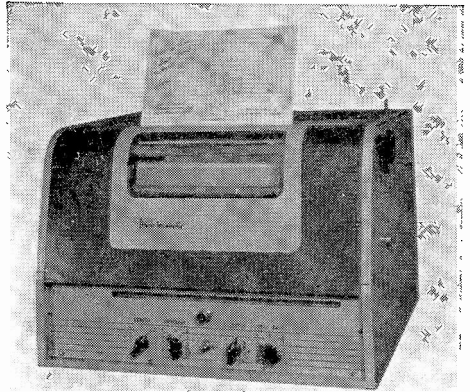
Fahnestock clip. A spring-type terminal to which a temporary connection can readily be made.

Fahrenheit (F). The temperature-measuring system generally used in the United States, in which 32 degrees is the freezing point and 212 degrees is the boiling point of water at sea level.

fan antenna. An antenna in which the elements are in a vertical plane and spread out fanwise from a common junction.

fan marker beacon. A transmitter having a radiation pattern in the shape of a fan, extending upward and at right angles to an airway beacon course to indicate position along the course.

farad. The basic unit of capacity. A condenser is said to have a capacity of 1 farad when a change of 1 volt per second across it produces a current of 1 ampere. A microfarad equals one millionth of a farad. A micromicrofarad equals one millionth of a microfarad.



Courtesy Finch Telecommunications, Inc.
Facsimile Receiver

Faraday shield. A network of parallel wires all interconnected at the same end like a comb, to provide electrostatic shielding. The end that connects to all conductors is grounded, and the entire assembly is placed between two coils to eliminate stray capacity, or around a loop aerial to eliminate electrostatic pickup of signals. A Faraday screen.

Federal Communications Commission (FCC). A board of commissioners appointed by the President, with power to regulate all U. S. communication systems, including radio, television, telegraph, cable, and telephone.

feed. To supply electric energy to one part or stage from another part or stage.

feedback. The return of a fraction of the electrical or the acoustic output to the input. When the fed-back signal is in phase with the input signal, positive feedback or regeneration ex-

- ists and increases the amplification. When the feedback signal is out of phase with the input signal, negative feedback or degeneration exists and decreases the amplification.
- feedback cutter.** In sound recording, a cutter in which a voltage generated by movement of the cutting stylus is fed back into the amplifier system, for the purpose of reducing distortion and stabilizing frequency characteristics.
- feeder.** A wire or set of wires supplying energy from a source to a load.
- ferromagnetic.** Magnetic in a high degree, like iron.
- fiber.** A hard, tough material made of wood pulp, compressed into sheets, rods, or tubes, and used in radio for insulating and supporting purposes.
- fidelity.** The faithfulness with which part or all of an electrical system delivers an exact reproduction of the input signal.
- field.** In black-and-white television, the area covered during one vertical sweep of the scene; consequently, in double-interlaced scanning, the field is one-half the area of the scene. In color television, scanning through the picture area once in the chosen scanning pattern and in one of the primary colors; consequently, in 2-to-1 line-interlaced scanning, the scanning of alternate lines once in a single color. Also see *color field*. Also, a general term describing the space surrounding an electrically charged object or magnet. See *electric field* and *magnetic field*.
- field coil.** In an electrodynamic loudspeaker, electric motor, or generator, the coil or coils that produce the magnetic field.
- field frequency.** In television systems using interlaced scanning, the number of times per second the frame area is scanned by a downward sweep of the electron beam.
- field gain.** The ratio of the field intensity of a multi-element antenna to that of a simple half-wave antenna fed with the same power.
- field intensity.** The effective (rms) value of the electric or magnetic field produced at a point by radio waves from a particular station. It is usually expressed as electric field intensity in microvolts per meter or millivolts per meter. Also, the amount of magnetic flux produced by an electromagnet or permanent magnet.
- field of view.** The area included in a televised image as "seen" by the camera.
- field period.** In television, the length of time required to scan one field, equal to 1 divided by the field frequency.
- field pole.** The structure of magnetic material on which a field coil is wound in a motor, generator, loudspeaker, etc.
- field repetition rate.** See *field frequency*.
- field rheostat.** A variable resistance used to regulate the current flowing through the field coils of a motor or generator.
- field sequential.** In color television, an arrangement in which an entire field is scanned in one primary color before it is scanned in another color.
- field strength.** See *field intensity*.
- figure of merit.** A property or characteristic of a tube, coil, or other electronic device that makes it suitable for a particular application.
- filament.** The resistance wire through which current is sent in a vacuum tube to produce the heat required for electron emission. When electron emission is from the surface of the filament wire itself, the filament also serves as the cathode.
- filament circuit.** The complete circuit through which current flows from the filament voltage source to the filaments of radio tubes.
- filament current.** The current supplied to the filament of a vacuum tube for heating purposes.
- filament emission.** The process by which electrons are given off from a heated filament in a vacuum tube.
- filament rheostat.** A variable resistance used to limit the flow of current through the filaments of vacuum tubes.
- filament saturation.** See *temperature saturation*.
- filament voltage.** The voltage that must be applied to the filament terminals of a vacuum tube in order to send the rated value of current through the filament.
- filament winding.** A separate secondary winding provided on a transformer for use as a filament voltage source.
- film scanning.** The process of converting movie film into electrical signals that can be transmitted by a television system.
- filter.** A selective network designed to pass signals within a certain range of frequencies while reducing considerably the amplitudes of signals at undesired frequencies. A low-pass filter passes all frequencies below its cut-off value. A high-pass filter passes all frequencies above its cut-off value. A band-pass filter passes all frequencies between its two cut-off values. A band-elimination filter passes frequencies outside its two cut-off values, eliminating frequencies between. A filter consists of some combination of resistors, coils, and condensers, sometimes also with a crystal. Also, a substance that absorbs or blocks certain colors of light while allowing others to pass.
- filter choke.** A coil used in a filter system.
- filter condenser.** A condenser used in a filter system.
- fine tuning control.** A control on the receiver that permits varying the frequency of the local oscillator over a small range to compensate for drift and permit accurate adjustment to a station's carrier frequency.
- fins.** Radial sheets or discs of metal attached to a power tube or other component for dissipating heat.
- firing.** The process of gas ionization and the start of current flow in gas or vapor-filled tubes.
- firing point.** The voltage at which the gas or vapor in a tube ionizes and current begins to flow.
- firing potential.** See *firing point*.
- first audio stage.** The first stage in the audio amplifier of a receiver to which audio signals are fed.
- first detector.** The stage in a superheterodyne receiver in which the incoming modulated rf signal and the rf signal from the local oscillator are combined to produce the i-f signal.
- fishbone antenna.** A directional antenna consisting of a number of doublets attached to a transmission line, with all doublets making the same angle with the line, to form a herringbone pattern.
- fishpaper.** A specially treated fiber paper used to insulate transformer windings.

- dc voltage proportional to the frequency difference between the carrier frequency and its assigned frequency.
- frequency distortion.** A type of distortion that occurs when a circuit or device amplifies or transmits unequally the different frequencies it is handling.
- frequency divider.** A device delivering output voltage at a frequency that is a fraction of the input frequency. A flip-flop circuit.
- frequency-division multiplex.** A system of sending two or more signals on one carrier by causing each modulating signal to modulate different sub-carriers, all of which in turn modulate the main carrier.
- frequency doubler.** A circuit arranged so that the frequency of its output is twice that of its input. Usually it is a class C amplifier adjusted so that the plate circuit will have strong harmonics of the input signal, with the plate tank circuit tuned to the second harmonic of the input. It may also be a full-wave rectifier feeding a tank circuit tuned to the second harmonic of the input.
- frequency drift.** A slow change in the frequency of an oscillator or transmitter, usually due to temperature changes in oscillator circuit parts.
- frequency meter.** An instrument for measuring frequency. A wavemeter.
- frequency modulation.** A system of radio broadcasting in which the amount of deviation in frequency above and below the resting frequency is at each instant proportional to the amplitude of the sound wave being transmitted, and the number of complete deviations per second above and below the resting frequency is equal to the frequency of the sound wave being transmitted.
- frequency monitor.** An instrument that indicates the amount of frequency deviation.
- frequency multiplier.** A stage or section used to increase the frequency of a signal, such as a doubler, tripler, etc.
- frequency, natural.** The resonant frequency of a tank circuit.
- frequency range.** A frequency band, especially one including the frequencies at which a system is able to transmit, receive, attenuate, or amplify power.
- frequency record.** A phonograph record used as a source of signals for testing audio equipment. Various known frequencies throughout the audio frequency range are recorded at fixed amplitudes on this record.
- frequency regulator.** A device that maintains the frequency of a signal source at a predetermined value.
- frequency response.** The manner in which a circuit or device handles the frequencies falling within its operating range.
- frequency response curve.** A graph showing the frequency response of a radio part, circuit, or system.
- frequency separator.** The television receiver circuit that separates the horizontal synchronizing pulses from the vertical synchronizing pulses.
- frequency shift.** A change in the frequency of an oscillator or transmitter.
- frequency-shift transmission.** A system of code transmission that shifts the carrier frequency back and forth between two distinct frequencies to designate mark and space, instead of keying the carrier on and off.
- frequency stability.** The ability of a transmitter, signal generator, or other signal source to maintain a given frequency. Usually expressed as a percentage of deviation within which the frequency is maintained.
- frequency stabilization.** The process of controlling the frequency so that it does not differ more than a prescribed amount from that of a reference source.
- frequency standard.** A highly stable, accurate, signal source which generates a frequency to which, or to the harmonics of which, other frequencies can be compared.
- frequency swing.** In frequency modulation, the departure of the carrier frequency from the resting frequency.
- frequency tolerance.** The maximum permissible amount of variation in either direction from the assigned carrier frequency.
- frequency tripler.** A device delivering output voltage at a frequency three times the input frequency.
- frictional loss.** Energy expended in overcoming friction between moving parts.
- friction tape.** Cotton tape impregnated with a sticky moisture-repellent compound, used chiefly to hold rubber-tape insulation in place.
- fringe howl.** A squeal or howl heard when some circuit in a receiver or amplifier is on the verge of oscillation.
- front porch.** In a television signal, the portion of the blanking pedestal immediately preceding a synchronizing pulse, by which the signal is held at the black level to prevent picture information from interfering with synchronization.
- front-to-back ratio.** In a multi-element directional antenna, the ratio between the signal radiated or received in the desired front direction and the signal radiated or received in the opposite or rear direction. Also called front-to-rear ratio. Also, in non-tube rectifiers such as selenium rectifiers or germanium crystals, the ratio of the current in the desired direction to that passed in the undesired direction.
- full-wave rectifier.** A radio tube or other device that rectifies an alternating current in such a way that both halves of each input ac cycle appear in the pulsating rectified output. A full-wave rectifier tube contains two separate diode sections, one passing current during one alternation, and the other passing current during the opposite half-cycle.
- fundamental frequency.** The lowest frequency component in a complex signal having harmonics. The lowest or natural resonant frequency of a part or circuit.
- fundamental wavelength.** The wavelength corresponding to the fundamental frequency.
- fuse.** A protective device consisting of a short piece of wire or strip of metal that melts and breaks when the current through it exceeds the rated value of the fuse. Fuses are inserted to open a circuit automatically in case of serious overload, thereby preventing damage to parts.
- fuse block.** An insulating base on which are mounted fuse clips or other contacts for holding fuses.
- fuse clip.** A spring contact for holding a fuse in position and providing a connection.
- fuse link.** The metal portion inside a fuse that melts at the rated current value.
- fuse wire.** Wire made from an alloy that melts at a relatively low temperature.

G

gage. Alternate spelling of *gauge*.

gain. In an amplifier stage or system, the ratio of output to input, sometimes expressed in decibels.

gain control. A control connected so that it can change the over-all gain of an amplifier or system. A volume control or contrast control.

gain of an antenna. A rating expressing how much better one transmitting or receiving antenna is than another. For constant transmitted power level, the measured gain is the ratio of the signal powers produced at the input terminals of a receiver by the antennas under comparison.

galena. Lead sulphide, a shiny, bluish-gray mineral once widely used as the crystal in crystal detectors.

galvanometer. A current-indicating meter, usually having a scale indicating relative deflection or degrees of deflection, from which the amount of current can be calculated. When the meter has a current scale indicating milliamperes or amperes, it is called a milliammeter or ammeter.

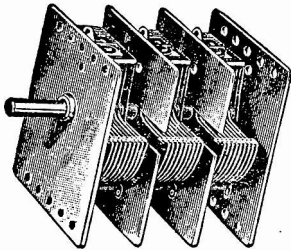
gamma. The ratio of the contrast of any two elements of the picture to the original contrast of these same elements in the scene being televised.

gamma ray. An electromagnetic radiation, similar to x-rays but of shorter wavelength.

gang. A number of similar pieces of apparatus mounted so they can be simultaneously adjusted by a single control shaft.

gang switch. Two or more rotary switches mounted on the same shaft and operated by a single control.

gang tuning condenser. Two or more variable tuning condensers mounted on the same shaft and operated by a single control.



Gang Tuning Condenser

gap. In a device in which a ferromagnetic substance provides most of the path for magnetic flux, the gap is that portion of the magnetic circuit in which there is no ferromagnetic material. Also the space between the surfaces of two electrodes.

gap arrester. An antenna lightning arrester in which there is an air gap between two metal points that in turn are connected to the antenna and ground. The gap arcs over when the antenna is struck by lightning, grounding the charge.

gas current. A current consisting of positive ions produced by gas ionization in a tube.

gaseous conduction. The conduction of electricity through a gas due to ionization of the gas by

collision of electrons with gas molecules.

gaseous tube. An electronic tube into which a small amount of gas or vapor is admitted after the tube has been evacuated. Ionization of the gas molecules during operation of the tube gives greatly increased current flow.

gas focusing. Focusing of the electron beam in a cathode ray tube by the action of ionized gas.

gasket. A ring or washer used for packing or insulating.

gas magnification. The increased electron flow in a gas-filled photocell due to ionization of gas.

gasoline-driven generator. An ac or dc generator operated by a gasoline engine.

gassing. The production of gases when a current is passed through a chemical solution. Specifically, the liberal production of gas in a storage battery when charging is continued after the battery is completely charged.

gassy tube. An imperfectly evacuated tube, one in which a small amount of gas accidentally remains. A "soft" tube.

gas tube. A vacuum tube in which gas or vapor is enclosed in order to substantially affect the electrical characteristics of the tube.

gating. The process of selecting those portions of a wave that exist during one or more time intervals or which have magnitudes between selected limits.

gauge. A standard of measurement or a device for measuring.

gauss. The unit of flux density, equal to one magnetic line of force per square centimeter. The term gauss has also been used as a unit of magnetic field intensity, equal to one gilbert per centimeter.

Geiger counter. Any of several devices for detecting and measuring radiation, as the *Geiger-Mueller counter*.

Geiger-Mueller counter. A device for measuring radiation, containing a gas-filled tube consisting of a metallic cylindrical sheath having a slender wire running axially through its center. Radiation such as from x-rays, gamma rays, beta rays, and alpha rays, traversing the gas causes ionization of the gas thus permitting a pulse to actuate an amplifying or counting circuit.

Geissler tube. A long gaseous tube that gives off colored light when a suitable voltage is applied to the electrodes, which are at opposite ends of the tube.

genemotor. A small motor-generator set, generally employed for plate voltage supply in mobile radio installations.

general number. A letter or symbol used for representing quantities. Thus, R is a general number (sometimes called a literal number) used to represent resistance.

generator. A machine that converts mechanical energy into electrical energy. It usually consists of a number of conductors mounted on an armature rotated in a magnetic field produced by field coils. A series generator has the armature, field, and load all in series. A shunt generator has the armature, field, and load all in parallel. A compound generator has two fields, one in series with the armature and the other in parallel with the armature. Also, a device, such as an oscillator, that develops an ac voltage at a desired frequency when energized with dc or low-frequency ac power.

geometric distortion. Non-linear aberrations in a TV picture's raster, such as keystoneing.

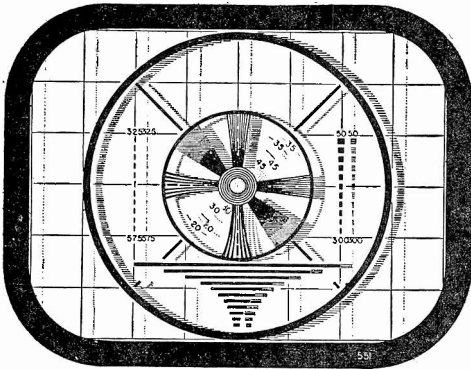
geometric mean. The square root of the product of two quantities.

geometry. The branch of mathematics that deals with the relations and measurements of solids, surfaces, lines, and angles.

germanium. A metallic element used as a detector because it has unidirectional conductivity.

german silver. An alloy of brass and nickel.

getter. An alkali metal introduced into a vacuum tube during manufacture and vaporized after the tube has been evacuated, to absorb any gases that may have been left by the vacuum pump. The silvery deposit on the inside of the glass envelope of a tube, usually near the tube base, is the result of getter evaporation.



Television Ghost

Courtesy Belmont

ghost. In television, an undesired duplicate image appearing a fraction of an inch to one side of the desired image, due to reception of a reflected signal along with the signal coming directly from the television station.

gilbert. The unit of magnetomotive force. One gilbert is equal to .796 ampere-turn.

Gill-Morrell oscillator. A retarding field oscillator in which the frequency of oscillation is dependent not only on electron transit time within the tube, but also on associated circuit parts values.

gimmick. A simple capacitor formed by twisting two wires together. Also, a piece of insulated wire, one end of which is connected to the antenna terminal of an antenna transformer, the other end being left unconnected. It is wound around the secondary to provide capacity coupling.

glide path. The path an airplane is to follow when using an instrument landing system. It is formed in space by two intersecting field patterns radiated in such a way that the glide path is the equisignal zone.

glow discharge. A current flow through a gas tube, at such a level that the space potential near the cathode exceeds the ionization potential of the gas, causing a visible glow.

glow-discharge voltage regulator. A gas tube whose resistance varies between about 5000 and 30,000 ohms, depending on the amount of applied voltage; used to maintain a constant voltage supply.

glow lamp. A gaseous tube having a glass envelope through which a glow due to ionization of the molecules of gas can be seen.

goniometer. An rf transformer used with a radio compass or direction finder. It has two pri-

maries at right angles, each connected to a loop antenna, and coupled to a rotary secondary. Rotating the secondary coil has the same effect as does rotating a loop antenna.

gradient. The rate of increase or decrease of a variable magnitude. Also, the curve representing such a rate of change.

gram. The unit of weight in the metric system. One pound is equal to 453 grams.

gramophone. A phonograph (English term).

graph. A pictorial representation of the relation existing between two or more quantities.

graphite. A soft form of carbon, used as a lubricant.

Grapholine. A lubricant containing carbon, used where conductivity must be maintained.

gray scale. A scale of brightness values.

Greenwich Mean Time (GMT). The time along the zero meridian of longitude which passes through Greenwich, England.

grid. An electrode mounted between the cathode and the anode of a radio or electronic tube to control the flow of electrons from cathode to anode.

grid bias. The voltage used to make the control grid of a radio tube negative with respect to the cathode. C bias.

grid bias cell. A bias cell used in the grid circuit of a vacuum tube.

grid-cathode capacitance. The capacitance between the grid and the cathode inside a vacuum tube.

grid characteristic. The graph plotted with grid voltage values as abscissas and grid current values as ordinates.

grid circuit. The circuit connected between the grid and cathode of a tube. It forms the input circuit of the tube.

grid clip. A spring clip used to make an easily removable connection to the cap terminal located at the top of some radio tubes.

grid condenser. A small fixed condenser used in conjunction with a resistor in the grid circuit of a vacuum tube for automatic biasing.

grid conductance. The ratio of the change in grid current to the change in grid voltage producing it, under the condition of constant plate voltage.

grid-controlled thyratron. A gaseous tube in which the grid determines when plate current starts to flow but not how much current will flow.

grid current. The current passing to or from a grid through the space inside a vacuum tube.

grid detection. Detection taking place in the grid circuit of a vacuum tube. Also called grid leak detection.

grid dip oscillator. An oscillator with a sensitive current meter connected in its grid circuit. When the oscillator is coupled to a resonant circuit, a sharp change in the meter reading indicates that power is being drawn from the oscillator and the two are in resonance.

grid emission. Emission of electrons or ions from a grid, usually due to the impact of electrons going from cathode to plate in the vacuum tube.

grid leak. A resistor of high ohmic value, connected between the control grid and the cathode in a grid-leak condenser detector circuit, for automatic biasing.

grid-leak condenser detector. A circuit in which detection occurs in the grid circuit of a tube, as the result of the diode action of the grid and cathode. The audio signals developed across the grid resistor are amplified by the tube.

grid-leak detector. See *grid-leak condenser detector*.

grid limiter. A circuit in which the plate current cannot increase appreciably with signal increases, because once the signal exceeds a critical value, grid current flows through a resistor in the grid circuit, thus producing an automatic bias that opposes further signal increases.

grid modulation. Modulation produced by introduction of the modulating wave into a grid circuit in which the carrier frequency wave is present.

grid neutralization. Neutralizing an amplifier by shifting part of the grid-cathode ac voltage 180° and applying it to the plate-cathode circuit through a neutralizing capacitor.

grid-plate capacitance. The capacitance between the grid and the plate within a vacuum tube.

grid pulse modulation. Modulation produced in an amplifier or oscillator by application of one or more modulating pulses to a grid circuit.

grid return. The lead or connection that provides a path for electrons from the grid circuit or C bias battery to the cathode.

grid suppressor. The resistor connected between the control grid and the tuned portion of the grid circuit of a radio-frequency amplifier to prevent oscillation.

grid swing. The total variation of grid voltage from positive peak to negative peak of the applied signal.

grid voltage. Voltage between grid and cathode. It is the grid signal voltage, or the grid bias voltage, or their combined voltage.

grille. An arrangement of wood or metal bars placed across the front of the loudspeaker in a receiver for protective purposes and to enhance the appearance of the cabinet.

grille cloth. A loosely woven cloth stretched behind the loudspeaker grille of a receiver to keep dust and other foreign matter out of the loudspeaker, as well as to conceal the loudspeaker diaphragm. Sound waves travel unimpeded through this cloth.

grommet. A washer made of rubber or other insulating material used to prevent a wire or part from touching the sides of a chassis hole.

groove. The track cut in a phonograph record by the stylus during recording, or the track in which a phonograph needle rides during playback.

groove velocity. The rate of motion of a phonograph needle from side to side in the groove.

ground. The earth, to which a connection is made by means of a buried conductor for radio purposes. Also, the chassis of a receiver when it serves as the return path for signal circuits.

ground absorption. The loss of power in transmission of radio waves due to dissipation in the ground.

ground clamp. A metal strap or clamp used for making a good electrical connection to a ground rod or grounded pipe. The clamp has a screw terminal or soldering lug to which the

ground wire of a receiver can readily be attached.

ground-controlled approach (GCA). The technique and/or apparatus for giving instructions to a pilot for landing under the conditions of poor visibility.

ground-controlled interception (GCI). Use of a radar display on the ground to locate enemy aircraft and guide intercepting aircraft to them.

grounded. Connected to earth or to some conducting body that serves in place of the earth.

grounded-cathode amplifier. A vacuum tube amplifier with cathode at ground potential at the operating frequency, with input applied between control grid and ground, and the output load connected between plate and ground. This is the "normal" amplifier connection for broadcast-band frequencies.

grounded-grid amplifier. A vacuum tube amplifier circuit in which the control grid is at ground potential at the operating frequency, with input applied between cathode and ground, and output load connected between plate and ground.

grounded-plate amplifier. A vacuum tube amplifier circuit in which the plate is at ground potential at the operating frequency, with input applied between control grid and ground, and the output load connected between cathode and ground. Also known as a cathode follower.

ground potential. The potential of the earth. A chassis, circuit, or terminal is at ground potential when it is electrically connected to the earth.

ground-reflected wave. The component of the ground wave that is reflected from the ground.

ground resistance. The resistance of the ground portion of a circuit using the ground as an integral part of the current path.

ground system. The portion of an antenna system closely associated with the ground, including the earth itself and any wires buried in it.

ground waves. Radio waves that travel along the surface of the earth instead of going up into the sky, and that are affected by the presence of the earth.

ground wire. A wire used to make connection from electronic apparatus to a ground clamp or other grounded object.

group velocity. The velocity of propagation of rf energy when confined between reflecting mediums, such as the walls of a waveguide, between which it is bounced back and forth. The path travelled is consequently longer than the distance from the point of origin to the point of reception, so that the speed with which the signal is received is less than that of the wave components along the reflected path.

growler. An electromagnetic device used for locating short-circuited coils in dynamo, generator, or motor armatures.

guard band. A frequency band provided at either end of a channel to prevent interference between adjacent channels.

guided wave. A wave whose propagation is concentrated in certain directions.

gutta-percha. A natural vegetable gum resembling rubber, used principally as insulation for wires and cables.

guy anchor. The buried weight or mass to which the lower end of a guy wire is attached.

guy wire. A wire used to brace the mast or tower of a transmitting or receiving antenna system.

H

hairpin pickup coil. A hairpin-shaped, single-turn coil used in vhf work to transfer energy from an rf generator, oscillator, amplifier, or transmitter to an antenna lead-in or to a succeeding stage.

hairpin tuning bar. A hairpin-shaped metal bar inserted between the two halves of a doublet antenna and used to vary the over-all electrical length of the antenna.

halation. Spreading of light so as to produce a ring of illumination surrounding the impact point of electrons on a fluorescent screen.

half-wave antenna. An antenna whose length is approximately equal to one-half the wavelength to be transmitted or received.

half-wave line. A line electrically equivalent to a half wavelength at the operating frequency.

half-wave rectificatiⁿ. Changing only one half of each alternating current cycle into unidirectional current.

half-wave rectifier. A radio tube or other device that converts alternating current into pulsating direct current by allowing current to pass during only one half of each alternating current cycle.

halo. See *halation*.

ham. Slang term for an amateur radio operator.

hard rubber. A brittle rubber compound used for electrical insulation or as a dielectric.

hard tube. A vacuum tube that has been evacuated to a high degree.

harmonic. An integral multiple of any frequency. Thus, the second harmonic of a fundamental frequency would be equal to twice that fundamental frequency.

harmonic analyzer. An instrument that measures the component pure sine waves of a complex wave.

harmonic antenna. An antenna whose length is an integral multiple of the wavelength or the half-wavelength with which it is used.

harmonic attenuation. The elimination of a harmonic component by use of a pi network in which the shunt reactances are tuned to zero for the frequency to be eliminated.

harmonic component. Any of the components (simple sinusoidal quantities) into which a periodic quantity can be resolved.

harmonic content. The degree or numbers of harmonics in a fundamental complex frequency output.

harmonic detector. A voltmeter circuit that measures only a particular harmonic of a fundamental frequency.

harmonic distortion. A distortion in which harmonics are added in the output signal that were not present in the input signal.

harmonic filter. An electronic circuit designed to attenuate harmonics in a particular piece of electronic equipment. See *harmonic attenuation*.

harmonic generator. A vacuum tube or other generator used to produce a signal having many strong harmonics.

harmonic suppression. The prevention of the generation of harmonics, or their attenuation after generation.

harmonic wave analyzer. An instrument that provides a means for determining the harmonic content of an af, rf, or ac output. A harmonic analyzer.

Hartley oscillator. A vacuum tube oscillator circuit using a tuned circuit that has a tapped winding connected between the grid and the plate of the vacuum tube, with the tap going to the cathode.

hash. Interference produced by man-made devices, such as that produced by vibrators that have excessive sparking at the contact points.

Hazeltine licensed. Radio apparatus that uses Hazeltine patents under a licensing agreement with the Hazeltine Corporation.

head. The cutting head in a recorder, a mechanism for cutting modulated grooves on a blank disc. Also, a rectifier built in a probe, used for measuring rf voltages without upsetting the circuit.

headphone. A small telephone receiver, usually held against the ear by a clamp passing over the head, used for private reception of radio programs or for reception of signals too weak to provide loudspeaker volume.

headphone adapter. A device that slips under the power output tube, or is otherwise connected to a radio receiver, to provide terminals to which headphones can be connected.

headset. A pair of headphones attached to a headband to hold the phones snugly against the ears.

heater. A filament used in vacuum tubes for the purpose of supplying heat to an indirectly heated cathode.

heater current. The current supplied to a vacuum tube filament used only for heating purposes.

heater voltage. The voltage applied between the terminals of a vacuum tube filament used only for heating purposes.

heat loss. Power dissipated as heat.

heat waves. Infra-red radiation similar to radio waves, but of higher frequency.

Heaviside layer. A layer of ionized gas which exists in the region between 50 and 400 miles above the surface of the earth, and which reflects radio waves back to earth under certain conditions. Also called the Kennelly-Heaviside layer.

height control. The control in a television receiver that adjusts the picture size in a vertical direction. Also called the vertical size control.

Heising modulation. A modulation system in which the plates of both the rf oscillator and the modulator tube are fed through a single common choke having high impedance at both audio and radio frequencies. This choke prevents any change in the total plate current drawn by the two tubes together. Therefore, the af plate current variation in the modulator tube produces a similar but opposite af variation in the plate current of the rf oscillator tube. Also called constant-current modulation.

helical. Having the shape of a helix or coil. Spiral.

helix. A coil wound in spiral form. The shape of a machine screw thread.

- henry (h).** The unit of inductance. A device has an inductance of 1 henry when an electromotive force of 1 volt is induced in it by a current changing at the rate of 1 ampere per second.
- heptode.** A vacuum tube having seven electrodes.
- hermetically sealed.** Sealed so as to be air-tight.
- Hertz antenna.** An antenna that is electrically independent of the ground.
- heterodyne.** Pertaining to the production of sum and difference frequencies and their associated harmonics by combining two frequencies.
- heterodyne frequency.** A frequency, produced by combining two other frequencies, which is their numerical sum or difference. A beat frequency.
- heterodyne frequency meter.** See *heterodyne wavemeter*.
- heterodyne harmonic analyzer.** A circuit in which a complex input voltage is examined by beating it with a variable frequency oscillator signal, and filtering the resultant beats to separate the harmonics.
- heterodyne interference.** Interference between two stations transmitting on nearly the same frequencies so their waves produce a beat note that causes an audible tone in receivers.
- heterodyne reception.** A process of changing the carrier frequency of an incoming signal by combining it with a locally generated signal. Usually called superheterodyne reception.
- heterodyne wavemeter.** A wavemeter used to determine the frequency of a signal by heterodyning the known frequency of its internal oscillator with the received rf frequency, and tuning the internal oscillator to produce a zero beat. Also called heterodyne frequency meter.
- heterodyne whistle.** A steady squeal heard in a receiver due to a beat formed by heterodyne interference between stations having nearly equal carrier frequencies.
- hexode.** A vacuum tube having six electrodes.
- high-angle radiation.** Radiation from a transmitting antenna in a vertical or nearly vertical direction.
- high definition.** The television or facsimile equivalent of audio high fidelity, in which the reproduced image contains as nearly as possible all picture elements, accurately reproduced, with each detail clearly visible.
- high fidelity.** The ability of an audio component, amplifier, or system to reproduce with a minimum of distortion the full audio range of frequencies.
- high-fidelity receiver.** A receiver capable of reproducing audio frequencies in a range from 50 to about 8000 cycles or wider without serious distortion, so that the reproduced program cannot be distinguished from the original studio program.
- high-frequency resistance.** The total effective resistance of a circuit to high-frequency currents, including eddy current, hysteresis, dielectric, corona, and ohmic losses.
- high-frequency trimmer.** In a superheterodyne receiver, the trimmer condenser that controls the calibration of a tuning circuit at the high-frequency end of a tuning range.
- high-level detector.** See *power detector*.
- high-level modulation.** Modulation at a point in a transmitter where the power level is approximately the same as at the output of the transmitter.
- highlight.** Pictorially, a point of great illumination or the brightest parts of a reproduced image.
- high-mu tube.** A tube having a high amplification factor.
- high-pass filter.** A filter network designed to pass all frequencies above a cut-off frequency value while attenuating or rejecting lower frequencies.
- high Q.** High ratio of reactance to ac resistance for any resonant circuit or coil.
- high-resistance voltmeter.** A voltmeter having a very high resistance, so that little current is drawn by the meter from the circuit in which a measurement is made.
- high-tension.** A term applied to circuits handling thousands of volts.
- high-vacuum tube.** A vacuum tube that has been evacuated so thoroughly that gaseous ionization cannot occur during normal operation.
- high-voltage power supply.** Equipment designed to provide high voltage, as for acceleration of the beam in iconoscopes or Kinescopes.
- hill-and-dale recording.** See *vertical recording*.
- hissing.** A noise encountered in sensitive radio receivers due to feedback or to circuit and tube shot effects.
- H network.** A network composed of five impedance or resistance sections, connected to resemble the letter "H."
- hold controls.** In a television receiver, the two manually adjusted controls that adjust the natural oscillating frequencies of the oscillators used in the horizontal and vertical sweep circuits. Also called speed or framing controls.
- homing.** An aviation direction finding system in which a non-directional signal is radiated by a transmitter at an airport or carrier, and a fixed directional antenna is used on the airplane so that maximum signal is received only when the plane is headed toward the transmitter.
- honeycomb coil.** A coil wound in a criss-cross or basket-weave manner to reduce distributed capacity. Also called lattice-wound coil.
- hookup.** A diagram giving circuit connections for a receiver, amplifier, or transmitter.
- hookup wire.** Tinned and insulated soft drawn copper wire used in wiring radios, TV sets, switchboards, etc.
- hop.** An excursion of a radio wave from the earth to the ionosphere and back to earth, in traveling from one point to another. Also, a slang term for sensitivity.
- horizon.** In radio-wave propagation over the earth, the line that bounds that part of the earth's surface reached by the direct wave. On a spherical surface, the horizon is a circle.
- horizontal.** Level. From side to side.
- horizontal afc.** An automatic frequency control circuit used to lock the horizontal sweep of a TV receiver to the average of the sync pulses.
- horizontal amplitude control.** See *width control*.
- horizontal blanking.** The application of cut-off bias to a cathode ray tube during the horizontal retrace.
- horizontal blanking pulse.** The pulse that cuts off

- the electron beam while it is returning to the left side of the screen of a cathode ray tube.
- horizontal centering control.** A control provided in a television receiver or cathode ray oscilloscope to shift the position of the entire image from side to side. Also called horizontal positioning control.
- horizontal deflecting electrode.** One of the cathode ray tube electrodes to which voltage is applied to move the electron beam from side to side.
- horizontal drive control.** The control on an electromagnetically deflected television receiver that adjusts the grid input on the horizontal output tube, thus affecting both the width and the linearity of the horizontal sweep. Also called horizontal peaking control.
- horizontal flyback.** In a television system, the right-to-left return motion of the electron beam from the end of one line to the beginning of the next.
- horizontal frequency.** In television, the number of times per second the spot sweeps across the screen in the horizontal direction. The horizontal repetition rate.
- horizontal hold control.** The control that adjusts the frequency of the horizontal sweep oscillator in a television receiver so that it can be locked in with the sync pulses. Also called the horizontal speed or framing control.
- horizontal linearity control.** In television, a control provided to adjust the uniformity of the distribution of picture elements in a horizontal direction.
- horizontally polarized wave.** An electromagnetic wave in which the electric field is parallel to the surface of the earth.
- horizontal peaking control.** See *horizontal drive control*.
- horizontal positioning control.** See *horizontal centering control*.
- horizontal repetition rate.** See *horizontal frequency*.
- horizontal resolution.** The definition or clarity of a television image in a horizontal line.
- horizontal retrace.** See *horizontal flyback*.
- horizontal scanning frequency.** See *horizontal frequency*.
- horizontal size control.** See *width control*.
- horizontal speed control.** See *horizontal hold control*.
- horizontal sweep.** In television, the circuit that produces the horizontal scanning voltage.
- horizontal synchronization.** Making the horizontal scanning at the receiver occur at the same relative time as the horizontal scanning at the camera.
- horizontal synchronizing pulse.** The pulse sent at the end of each line for controlling the horizontal sweep rate. The line synchronizing pulse.
- horn.** A tapering tube used in some loudspeakers in place of a baffle. The smaller end of the horn is the throat, the larger the mouth.
- horn radiator.** A tapered metal box used as a guide for radiated waves.
- horsepower.** A unit of power, the rate of doing work. One horsepower is mechanically equivalent to 33,000 foot-pounds per minute or 550 foot-pounds per second, and is electrically equivalent to 746 watts.
- horseshoe magnet.** A magnetized steel bar bent into the shape of a horseshoe.
- hot.** Connected, alive, energized, not grounded. Heated.
- hot-cathode tube.** A vacuum or gaseous tube in which the cathode is heated to provide electron emission.
- hot-wire ammeter.** An ammeter that depends for its action on the expansion of a fine wire under the influence of the heat produced in it by the passage of the current to be measured.
- howl.** An undesirable audio-frequency oscillation occurring in a radio or amplifier system, due to either electrical or acoustic feedback.
- H pad.** An attenuation network having its elements arranged like the letter H, with a constant input and output impedance.
- H plane.** The plane of an antenna in which the magnetic field lies, perpendicular to the E plane.
- hum.** A low audio frequency, having the same frequency as that of the power supply or a harmonic thereof, introduced into the signal paths by induction, leakage, or insufficient filtering, and heard in the background of a received radio program, or appearing across a television image in the form of one or two horizontal bars.
- hum-bucking coil.** An extra coil placed on the center pole of an electrodynamic loudspeaker and wired in series with the voice coil so that hum currents induced in both coils by the field coil will cancel.
- hum modulation.** Hum audible only when a station is tuned in, originating in an rf stage.
- hunting.** Speed variation or oscillation about the average or synchronous speed of rotation of a motor.
- hydrometer.** A device used to measure the specific gravity of a liquid.
- hygroscopic.** Readily absorbing and retaining moisture.
- Hypex horn.** A loudspeaker horn having a modified exponential rate of growth.
- hypotenuse.** The side of a right triangle opposite the right angle.
- hysteresis.** The tendency of a ferromagnetic material to retain magnetism or to oppose a change in magnetism, resulting in a loss of energy.
- hysteresis loop.** A graph showing the relation between magnetizing force and flux density over a complete cycle of magnetization and demagnetization.
- hysteresis loss.** Energy loss in a magnetic substance exposed to a constantly changing magnetic field due to internal friction, appearing as heat.
- iconoscope.** A cathode-ray pickup tube used in electronic television cameras. It converts each picture element of the scene into a corresponding electrical signal. Scanning of the image is accomplished by making an electron beam sweep back and forth across the mosaic many times per second.
- identification of friend or foe (IFF).** A system of challenge and response by radar, involving transmission of coded signals.

idler pulley. A pulley used to maintain tension on or to change the direction of motion of a belt or cord. Its shaft does not rotate any other part.

ignition interference. Interference produced by sparks or other ignition discharges, or equipment in which there are loose contacts or connections.

ignitor. An electrode made of highly resistive material, partly immersed in the mercury-pool cathode of an ignitron tube and used to activate the ignitron by starting the ionization process.

ignitron. A half-wave mercury-vapor tube used as a high-power rectifier.

illumination. The amount of light flux falling on a surface, usually measured in foot candles.

illuminosity meter. A device for measuring light flux or amount of illumination, generally using a photoelectric cell to convert light energy into an electric current that can be measured.

image. A reproduction of a person, object, or scene, such as that produced by a television receiver.

image antenna. An imaginary antenna considered the source of reflected waves.

image dissector. A television pickup tube that converts the optical image to an equivalent electron image and then scans this electron image by allowing a small portion of it at a time to pass into an electron multiplier tube.

image distortion. Faulty transmission or reproduction of the scene scanned by a television camera.



Image Orthicon

Courtesy RCA

image orthicon. A television camera tube in which a low-velocity electron beam is used to pick up the image signal; then an electron multiplier in the tube is used to amplify it.

image ratio. The ratio of the strength of a signal to its image, used to indicate selectivity of a receiver.

image reconstructor. The picture tube or other device used in a television receiver to convert the received picture signals into an image of the scene originally televised.

imaginary number. The square root of a negative number. In formulas the letter j indicates the square root of minus one.

impact excitation. The starting of damped oscillations in a circuit by a sudden pulse. Shock excitation.

impedance. The total opposition a part or circuit offers to the flow of alternating current at a particular frequency. A combination of resistance and reactance measured in ohms.

impedance bridge. A device to measure the combined resistance and reactance of a part.

impedance coil. See *choke coil*. An inductor.

impedance coupling. Coupling between stages by a circuit resembling resistance coupling, with one or both resistors replaced by choke coils.

impedance match. A condition in which the impedance of a component or circuit is equal to the impedance of the source to which it is connected.

impedance-matching transformer. A transformer used to provide an impedance match between two or more circuits.

implode. To burst inward, as does a television picture tube when cracked. The high vacuum causes the external pressure to be so great that the glass fragments are forced inward at a high velocity.

impregnate. To treat a component so as to make it moisture resistant by filling the excess space in its container with a material such as wax or pitch. Also applied to the coating of a part with a similar material.

impulse. See *pulse*.

impulse noise. Random, sharp bursts of noise.

inactive lines. The television image lines not visible on the picture tube screen, those of the 525 image lines that are blanked out between fields.

incident light. Light falling on a surface.

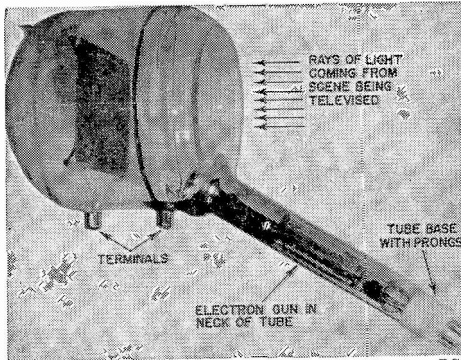
incident wave. A wave striking an object.

inclination. The angle a line or surface makes with another line or surface.

increment. A change in the value of a variable.

incremental permeability. The permeability effective in a core when an ac fluctuation in current is superimposed on a dc current.

index. The small number in the angle of a radical sign, indicating the particular root to be



Iconoscope

Courtesy RCA

image frequency. A frequency on the opposite side of the oscillator frequency from that of the desired frequency, and differing from the oscillator frequency by the $i-f$ value. For example, in a superheterodyne receiver in which the oscillator operates above the incoming signal frequency, the image frequency is equal to the sum of the oscillator frequency and the $i-f$ value, and the image frequency is above the desired signal frequency by twice the $i-f$ value.

image interference. Interference in which two stations are heard at the same time, one being the desired station, and the other being an undesired station at the image frequency.

image-interference ratio. A superheterodyne receiver rating indicating how effectively the rf tuned circuits ahead of the first detector can reject signals at the image frequency when tuned to a desired frequency.

- extracted. Examples: In \sqrt{x} , the index is 4; in $\sqrt[4]{64}$, the index is 3.
- Index of refraction.** A number indicating how much a ray of light will be bent out of its normal path when passing from one material into another. It is equal to the speed of light in one material divided by the speed of light in the other material.
- Indicator.** An instrument used to detect the presence of an electrical quantity without necessarily measuring it.
- Indirectly heated cathode.** In a vacuum tube, a cathode heated by a separate filament.
- Indirect scanning.** A method of scanning in which a beam of light is moved across a scene or picture, and the light reflected from the illuminated scene is picked up by a photocell or group of photocells.
- Indirect view.** A television receiver in which the image is optically projected from the cathode ray tube to a larger viewing screen.
- Indirect wave.** Sky wave.
- Indoor antenna.** A receiving antenna system located entirely inside a building.
- Induced charge.** An electrostatic charge produced on an object by an electric field in the vicinity.
- Induced current.** A current due to an induced voltage.
- Induced voltage.** A voltage produced in a circuit by changes in the number of magnetic lines of force linking or cutting through the conductors of the circuit.
- Inductance (L).** The property of a circuit or coil that causes an electromotive force (voltage) to be set up because of a change in current in the circuit or coil, or that determines how much electromotive force will be induced in one of two neighboring coils or circuits by a change in the other. Inductance is effective only when a varying or alternating current exists, and has no effect on direct current. The basic unit of inductance is the henry. A circuit has an inductance of 1 henry when a change of current of 1 ampere per second induces an electromotive force of 1 volt.
- Inductance bridge.** A form of Wheatstone bridge circuit used to determine inductance values.
- Inductance-tube modulation.** Frequency modulation by means of an oscillator control tube that acts as a variable inductance in parallel with the tank circuit of an rf oscillator, causing the oscillator frequency to vary in proportion to the af voltage applied to the grid of the oscillator control tube.
- Induction.** A coupling produced by magnetic lines of force whereby the variable flow of current through one coil produces a voltage in a nearby coil even though there is no electrical connection between the coils. Also, the production of a charge or of magnetism by the presence of an electric or a magnetic field.
- Induction coil.** A device with some form of interrupter for changing direct current into high-voltage alternating current.
- Induction compass.** A compass whose indications depend on a coil revolving in the magnetic field of the earth. An earth inductor compass.
- Induction field.** The portion of the electromagnetic field produced by a transmitting antenna that acts as if it were permanently associated with the antenna. The *radiation field*, on the other hand, breaks away from the antenna to form radio waves.
- Induction heating.** An industrial or laboratory process in which rf power is coupled by highly efficient coils into a load for melting, welding or brazing, or heating.
- Induction motor.** An electric motor operated on the principle that a pivoted closed loop of wire will rotate essentially in step with a rotating magnetic field.
- Inductive coupling.** A form of coupling in which energy is transferred from a coil in one circuit to a coil in another circuit by induction.
- Inductive feedback.** Feedback of energy from the plate circuit to the grid circuit of a tube by inductive coupling.
- Inductive reactance.** Reactance due to the inductance of a coil or other part in an alternating current circuit. Inductive reactance is measured in ohms, and is equal to the inductance in henrys multiplied by the frequency in cycles, times the number 6.28.
- Inductor.** Inductance. Coil.
- Inert gas.** One of a group of gases including helium, neon, argon, krypton, and xenon, that will not combine with another element.
- Inertia.** The property of matter that tends to prevent motion, or resists a change of motion.
- Infinite.** Without limit.
- Infinite-impedance detector.** See *C bias detector*.
- Infinite line.** An imaginary transmission line that has all the characteristics of an ordinary line, but is infinitely long.
- Infinity.** A number greater than any definite number.
- Infra-black region.** See *blacker-than-black region*.
- Infra-red rays.** Rays of longer wavelength than visible light rays, lying just beyond the red end of the spectrum. Heat rays.
- Infrasonic.** Having a frequency below the audible range.
- Injection grid.** A grid element placed in a vacuum tube in such a way that it has reasonable control over the electron stream without causing interaction between itself and the control grid.
- Ink-vapor recording.** The type of electromechanical facsimile recording in which vaporized ink particles are directly deposited upon the record sheet.
- In phase.** Having the same frequency and passing through maximum values at the same instant of time, exactly in step.
- Input.** The current, voltage, or power fed into a circuit or device. Also, the terminals to which the incoming signal is applied.
- Input admittance.** The reciprocal of the impedance between the grid and the cathode of a tube, determined by the internal tube capacities and the coupling effects of the grid-to-plate capacity.
- Input capacity.** The sum of all the direct input capacities between the grid and all other electrodes of a vacuum tube, plus the grid-plate capacity as increased by the Miller effect.
- Input gap.** Gap in which the initial velocity modulation of the electron stream is produced in a klystron. The buncher gap.
- Input impedance.** The ratio of the ac voltage applied to the input terminals of a circuit or device to the alternating current thereby produced.

input transformer. A transformer used to deliver energy to the input of a device or amplifier.

insertion loss. The ratio (expressed in decibels) of the power delivered before, to the power delivered after, the insertion of an apparatus in a transmission system.

instantaneous power output. The rate at which energy is delivered to a load at a particular instant.

instantaneous recording. A recording that can be played without further processing.

instantaneous value. The value of an alternating current, voltage, or power at any one point in its cycle.

instrument landing system (ILS). A radio system for guiding an airplane into a landing by instrument indications when visibility is limited.

instrument multiplier. A highly accurate series resistor used to extend the voltage range of a meter.

instrument shunt. A highly accurate low-value resistor connected in parallel with a meter to extend its current range.

insulated carbon resistor. A carbon resistor encased in a molded ceramic, fiber, or plastic housing.

insulating tape. Tape impregnated with insulating material, usually adhesive and used to cover joints in insulated wire or cables. Also rubber tape.

insulation. Any material that has a sufficiently high electrical resistance to separate one electrical circuit, part, or wire from others. Cotton, silk, baked enamel, mica, porcelain, rubber, and Bakelite are a few of the common insulating materials used in radio.

insulation resistance. The electrical resistance between two conductors separated by an insulating material.

insulator. An object that offers a great deal of opposition to the movements of electrons, used for supporting or separating conductors.

integer. Any whole number, without fractions or decimals.

integral sign. The sign \int , used in higher mathematics to indicate that the operation of integration (finding the sum of small elements or differentials) is to be performed.

integrating circuit. A low-pass filter circuit, one in which the output is the sum of the input pulses when these pulses occur at a rate faster than the discharge time of the circuit.

intelligence signal. The electrical signal that corresponds to the information or intelligence being handled, such as sound waves, television scenes, or code; also known as the low-frequency signal.

intensifier ring. A third anode in a cathode ray tube, consisting of a coating on the inside of the glass envelope. The application of a high positive potential to the intensifier ring increases the velocity of the electron stream, consequently increasing the intensity of the light.

intensity. Strength or value.

intensity modulation. The process of applying a voltage to the grid or cathode of a cathode ray tube to vary the intensity of the spot as it sweeps across the screen. Brilliance modulation, or Z-axis modulation.

intensity of illumination. The brightness of an illuminated surface. Intensity of illumination is normally indicated in foot-candles and is in-

versely proportional to the square of the distance from the source.

interaction gap. In a klystron, the space between the buncher grids or between the catcher grids, in which the electron stream interacts with an rf field.

intercarrier-noise suppression. A means for suppressing the noise otherwise heard in a high-gain receiver when it is tuned between station carriers. The audio input of the receiver is blocked automatically when no signals exist at the second detector.

intercarrier sound system. A method of utilizing the 4.5-mc beat between video and sound carriers as an i-f frequency for the sound signal of the television receiver. Also called intermodulation sound system.

intercom. See *intercommunication system*.

intercommunication system. An amplifier system that provides two-way communication between two or more points in a building.

interelectrode capacity. The direct capacity that exists between two electrodes in a vacuum tube.

interference. Noises or undesired programs that affect the reception of a desired program.

interference eliminator. Any device designed for the purpose of removing or reducing interference.

interference filter. A device used on a source of interference or on a receiver to attenuate or eliminate noise.

interference guard bands. Bands of frequencies in which no signals are transmitted, existing on either side of a channel, providing separation between signals of stations having adjacent frequency assignments to prevent adjacent-channel interference.

interference pattern. Any interfering pattern seen on a television screen, caused by hum, noise, etc.

interlaced scanning. In television, a system in which every other line of the image is scanned during one downward sweep of the scanning beam, and the remaining lines are scanned during the next downward sweep of the scanning beam.

interlock. A system that makes it impossible to open or close certain switches or relays until certain actions have taken place. For example, interlocking relays and switches may make it impossible to apply plate voltage to mercury vapor rectifier tubes until their filaments have reached operating temperature. Also, similar switches used on doors of transmitters or on television sets to automatically break the high voltage supply circuits when doors are opened or shields removed, to protect the operator or serviceman.

intermediate frequency (i-f). The frequency produced by the heterodyne process, equal to the difference between the frequency of the local oscillator and the incoming signal.

intermediate-frequency amplifier. The section of a superheterodyne receiver designed to amplify signals with high efficiency at a predetermined frequency called the intermediate frequency of the receiver.

intermediate-frequency harmonic interference. A kind of interference resulting when harmonics of the i-f signal get back into the rf input stages of a superheterodyne and come through these stages along with the desired signal.

intermediate-frequency transformer. A transformer used at the input or output of an i-f

- amplifier stage in a superheterodyne receiver for coupling purposes and for providing selectivity.
- intermittent duty.** Non-continuous operation.
- intermittent-duty rating.** The rating of a device when operated for specified intervals of time other than continuous duty.
- intermittent reception.** A type of faulty reception in which a receiver performs normally for a time, then becomes dead or otherwise defective, with the process repeating itself at regular or irregular intervals.
- intermodulation.** A process wherein two or more different signal frequencies combine in a nonlinear circuit to produce new frequencies corresponding to sums and differences of the fundamental frequencies and their harmonics.
- intermodulation distortion.** Signal components in the output not present in the input that have frequencies equal to the sums and differences of integral multiples of component frequencies present in the input signal.
- intermodulation interference.** Station interference that occurs when two undesired signals whose frequencies differ by exactly the i-f value of a superheterodyne receiver reach the first detector, and there produce an i-f beat signal without the aid of the local oscillator.
- intermodulation sound system.** See *intercarrier sound system*.
- internal resistance.** The resistance inside a battery, generator, or circuit component.
- International Morse Code.** The dot and dash code used universally for radiotelegraphy, and for wire telegraphy in some European countries. The Continental Code.
- interpolation.** The process of estimating the value of a quantity between two known values.
- interrupted continuous wave (icw).** A continuous wave modulated by an audio-frequency tone, then code keyed.
- interrupter.** Apparatus for breaking up a continuous current into successive pulses.
- interstage.** Between stages.
- interstage transformer.** A transformer used to provide coupling between two vacuum-tube stages.
- interval timer.** An electronic tube device used to measure time intervals.
- intrinsic impedance.** The impedance to an electromagnetic field, expressed as a ratio of the strengths of the electric and the magnetic fields. In a loss-free material or free space, it is determined by the ratio of the permeability and the dielectric constant.
- inverse feedback.** Negative feedback, also called degeneration or stabilized feedback. A fraction of the output signal of an amplifier stage is intentionally fed back to the input so it is out of phase, thereby reducing distortion and noise, permitting greater undistorted power output. It also reduces amplification.
- inverse feedback filter.** A resonance bridge circuit used at the output of a high-selectivity amplifier, in which the impedance is adjusted so that the feedback output is zero for the resonant frequency but increases rapidly as frequency departs from this value.
- inversely proportional.** Related in such a way that when one value increases, the other decreases a proportionate amount, and vice versa.
- inverse peak voltage.** The maximum ac voltage that can be applied to a rectifier tube without arcing or flashover when the filament is positive and the plate negative.
- inverted amplifier.** See *grounded-grid amplifier*.
- inverted L antenna.** The conventional antenna used for broadcast reception, having a long horizontal portion suspended between insulators, with the single-wire vertical lead-in connected to one end of the horizontal portion.
- inverter.** Any device used to change dc to ac.
- ion.** An electrified particle, such as an atom or molecule, having either fewer or more electrons than normal. A positive ion is a particle that has lost electrons, and a negative ion is one that has acquired more electrons than normal.
- ionization.** An action whereby atoms or molecules of gas in an electronic tube are converted into electrically charged ions, which are attracted by charged electrodes. Ionization makes a gaseous tube more conductive than an equivalent vacuum tube.
- ionization current.** Current flow between two oppositely charged electrodes in an ionized gas.
- ionization potential.** The voltage at which sufficient current will flow to ionize the gas in a tube.
- ionization pressure.** An increase in the pressure within a gaseous tube due to ionization of the gas.
- ionization time.** The time between the moment of application of voltage and the ionization of the gas.
- ionized layer.** See *Kennelly-Heaviside layer*.
- ionosphere.** The part of the earth's outer atmosphere where ions and electrons are present in quantities sufficient to affect the propagation of radio waves.
- ionospheric storm.** A period of disturbance in the ionosphere, during which radio waves are reflected in abnormal ways.
- ionospheric wave.** A radio wave that is reflected from the ionosphere. A sky wave.
- ion spot.** An insensitive dark spot on the screen of a cathode ray tube resulting from ionic bombardment of that spot.
- ion trap.** A coil or permanent magnet placed on the neck of the cathode ray tube to straighten the electron stream so that it can proceed to the screen, after this stream has been deflected in the process of bending aside the ion stream. A beam bender.
- IR drop.** Voltage drop produced across a resistor (R) by the flow of current (I) through it.
- I²R loss.** Power loss due to current flow through resistance.
- iron-core coil.** A coil wound on a form inside of which iron laminations are inserted.
- iron-core transformer.** A transformer in which iron makes up part or all of the path for magnetic lines of force traveling through the transformer windings.
- iron loss.** Power loss occurring in iron cores of electric machines, coils, transformers, etc., due to hysteresis and eddy currents.
- iron-vane instrument.** A meter in which the movable element is an iron vane, which is drawn into the magnetic field produced by the flow of the current being measured.
- Isolantite.** A high-quality insulating material

used in the construction and mounting of radio parts, particularly those used in ultra-high-frequency circuits.

isolation network. A network inserted in a circuit or transmission line to prevent interaction between circuits on each side of the insertion point.

iterative impedance. The characteristic or *surge impedance* of a transmission line or filter section.

J

jack. A plug-in spring terminal widely used in radio apparatus for temporary connections.

J antenna. A half-wave antenna, fed at the end by a quarter-wave line section so the two resemble the letter J.

JAN specification. Joint Army Navy specification.

jewel bearing. A small piece of natural or synthetic jewel, usually sapphire, carefully ground to form a bearing for the pivot of a meter movement.

jitters. Distortion in a received television or facsimile picture caused by momentary errors in synchronization between scanner and recorder.

joule. The unit of electrical work or energy. One joule equals one watt-second.

Joule's law of heating. The heat produced in a conductor is proportional to the resistance of the conductor, the square of the current, and the time.

jumper. Any conductor used to connect two points together or short out a part temporarily.

junction. A joint or connection. Also, a point of contact between two dissimilar metals or materials.

junction box. A box into which wires or cables are led and connected.

K

keep-alive anode. An auxiliary electrode in a mercury pool tube that keeps the mercury heated and thus ionized.

keeper. A piece of iron used to close the magnetic circuit of a permanent magnet to prevent loss in magnetic strength.

Kelvin scale. The absolute temperature scale; the equivalent Centigrade value, plus 273.1.

Kennelly-Heaviside layer. A layer of ionized gas supposed to exist in the region between 50 and 400 miles above the surface of the earth. It reflects radio waves to earth under certain conditions, making possible long-distance radio reception.

Kenotron. A high-vacuum rectifier tube.

Kerr cell. A device used in some mechanical television systems to modulate a light beam with television signals. The cell rotates a beam of plane-polarized light in proportion to the voltage applied between the two plates of the cell.

key. A lever switch designed for rapid opening and closing of a circuit during transmission of code signals. Also, a lever switch used on telephone switchboards to control speech circuits.

key-click filter. A filter that attenuates the surge produced when the keying circuit of a transmitter is opened or closed.

key clicks. The noise caused by the sharp current change when a sending key is opened or closed.

keyer. A device that changes the amplitude or frequency of the output of a transmitter in accordance with the intelligence to be transmitted.

keying chirps. Peculiar sounds accompanying code signals when the transmitter is unstable and shifts in frequency each time the sending key is closed.

keystone correction. To cause the horizontal sweep width in an iconoscope to increase when vertical scanning deflects the beam to the part of the mosaic nearest the electron gun, resulting in a rectangular rather than a keystone-shaped electron image.

keystone distortion. A form of distortion in which the television image takes the shape of a trapezoid, because the electron gun is not at right angles to the mosaic. This makes the electron path to the top of the picture longer than that to the bottom, and consequently the sweep is wider at the top than at the bottom.

keystone-shaped image. A reproduced image wider at the top than at the bottom (or vice versa).

keystoning. The effect produced when the electron gun of a cathode ray television camera tube is placed at an angle with the principal axis of the tube, resulting in a keystone-shaped scanning pattern.

kickback. The counter-electromotive force produced in a coil when the current through it is stopped and the magnetic field collapses.

kickback power supply. See *flyback supply*.

kilo. Metric prefix meaning 1000.

kilocycle. One thousand cycles.

kilogauss. A unit of flux density equal to 1000 gausses or 1000 lines of flux per square centimeter.

kilovolt. One thousand volts.

kilovolt-amperes. A unit of apparent power, equal to 1000 volt-amperes.

kilovoltmeter. A voltmeter scaled in thousands of volts.

kilowatt. A unit of electrical power equal to 1000 watts.

kilowatt-hour. A unit of electrical energy, equal to 1000 watt-hours. (Watts \times hours \div 1000.)

kinescope. A cathode ray tube used in television receivers for reproducing the scene being televised. A picture tube.

kinetic energy. The energy (ability to work) a moving object possesses by virtue of its motion.

Kirchhoff's Current Law. A fundamental electrical law which states that the sum of all the currents flowing to a point in a circuit is equal to the sum of all the currents flowing away from that point.

Kirchhoff's Voltage Law. A fundamental electrical law which states that the sum of all the voltage sources acting in a complete circuit is equal to the sum of all the voltage drops in that same circuit.

klystron. A tube in which the speed rather than the number of electrons is controlled by the input signal. Elements called the buncher grids velocity modulate the electron stream so the electrons collect in bunches in the drift space.

The catcher grids then extract energy from the electron bunches.

klystron oscillator. A microwave oscillator that uses a klystron to get considerable rf power at frequencies above 300 megacycles.

knee. An abrupt change in direction between two fairly straight segments of a curve.

knife switch. A switch in which one or more flat metal blades, each pivoted at one end, make contact with gripping spring clips to complete the circuit.

knob. A radio part, usually round but sometimes having a pointer or other position-indicating means, attached to the end of a control shaft or lever for ease or safety of operation.

L

laboratory. A place where scientific experiments and investigations are carried out, or where equipment is developed.

labyrinth. See *acoustic labyrinth*.

lacquer discs. Phonograph records usually of metal, glass, or paper, coated with a lacquer compound and used either for instantaneous recordings or lacquer masters.

ladder network. An adjustable attenuator network of the step type in which the steps are of known attenuation, and the network presents a known and constant load to the signal source. Also, a sequence of L, T, H, or pi networks.

lag. The difference between the time that two alternating quantities having the same frequency pass through corresponding values; the one that reaches a particular point in a cycle last is said to lag behind the other.

lagging current. An alternating current that is retarded by the inductance of the circuit, so that its changes occur after the voltage changes have occurred. When there is only inductance in the circuit, the current lags 90 degrees behind the voltage.

lag screw. A screw used for fastening objects to brick or masonry.

lambert. The unit of brightness, equal to one lumen per square centimeter.

laminated. Made of thin layers, strips, or plates.

lamination. A thin layer, strip or sheet. Specifically, one of iron or steel, used to build the core of a transformer or other device designed to operate at audio or power frequencies. Also, a thin layer of plastic-impregnated cloth, used in making insulating sheets or tubes.

lamp. An artificial source of light, infra-red, or ultra-violet radiation.

land. The surface between two grooves on a phonograph record.

land line. A telegraph or telephone line.

L antenna. An antenna consisting of one or more horizontal wires with a vertical lead-in connected at one end. An inverted L antenna.

lap dissolve. The effect of reducing the contrast and brightness of one picture to zero while simultaneously increasing the contrast and brightness of a second picture from zero to maximum so that one fades in as the other fades out on a television screen.

lapel microphone. A small microphone that can be attached to a lapel or pocket by means of a clip.

lapping. Finishing quartz crystal blanks by precision grinding.

lap winding. A type of winding of an armature in which each coil terminates at the next adjacent commutator segment.

laryngophone. A throat microphone.

latent image. Stored picture information, such as that contained in the charged globule-capacitances of the iconoscope.

lateral force. Force exerted from the side.

lateral recording. A recording in which the groove modulation is cut so that the phonograph needle moves from side to side during playback.

latitude. Distance north or south of the geographical equator, measured in degrees, minutes, and seconds, ranging from 0° at the equator to 90° at either pole.

lattice network. A network of four branches, two in series between input and output, one on each side of the line, and the remaining two cross-connected from input to output so that one goes from an input to the diagonally opposite output terminal and the other one goes between the remaining pair of terminals.

lattice-wound coils. Coils in which the windings are criss-crossed.

launching. Transferring energy from a coaxial cable or shielded paired cable into a wave guide.

law of electric charges. Like charges repel each other; unlike charges attract each other.

law of magnetism. Like poles repel; unlike poles attract.

law of position. The relationship that exists between the focal length and the distances of object and image from an optical lens: $\frac{1}{Q} + \frac{1}{f} = \frac{1}{P}$, where P = distance from lens to object, Q = distance from lens to image, and f = focal length of lens.

layer-built battery. A battery in which flat, wafer-like cells are laid one on top of the other, eliminating waste space.

layer windings. A coil-winding method in which adjacent turns are laid side by side along the length of the coil form, then succeeding turns are placed over the first layer in the same side-by-side manner.

layout. A diagram indicating the placement of parts on a panel or chassis.

LC product. Inductance multiplied by capacitance.

LC ratio. Inductance divided by capacitance.

lead (pronounced lead). Any connecting wire, such as a battery lead, a test lead, etc. Also, the opposite of lag. When two alternating quantities have the same frequency but do not pass through corresponding values at the same instant, the one which reaches a particular point in a cycle first is said to lead the other.

lead (pronounced led). A soft gray metal used in storage batteries, solder, and for shielding cables.

lead cell. The common storage battery cell that uses plates of lead compounds for the positive and negative electrodes.

lead-in. The portion of an antenna system that connects the main part of an antenna to the

input of a receiver or to the disconnecting switches or instruments of a transmitter or its tuning house.

lead-in insulator. A porcelain tube inserted in a hole drilled through an outer wall or window frame of a house through which the lead-in wire of the antenna is run.

lead-in spiral. A blank spiral groove at the beginning of a record, used to guide the phonograph needle into the recorded grooves.

lead screw (pronounced leed screw). In recording, the threaded rod that leads the cutter or reproducer across the surface of the disc.

leakage. Undesirable flow of current through or over the surface of an insulating material. Also, magnetic flux that takes a short-cut path so that it does no useful work. Also, the escape of a portion of an electromagnetic field along an undesired path.

leakage current. A current flowing between two or more electrodes of a tube by any path other than that through space.

leakage flux. The portion of the total magnetic flux that does not link with all of the turns of wire in a coil or transformer.

leakage inductance. The difference between the total inductance of a transformer winding and that used in transferring energy from one winding to another.

leakage radiation. Radiation from anything other than the intended radiating system.

leakage reactance. Opposition to alternating current offered by the leakage inductance of a transformer.

leakage resistance. The resistance of a path taken by leakage currents.

leaky. Having an abnormal resistance path so that undesired current flows.

Lecher frame. An insulated support along which Lecher wires are stretched.

Lecher oscillator. A device for producing a system of standing waves along two parallel wires called Lecher wires used in measuring frequencies above 28 mc.

Lecher wires. Parallel wires coupled to a transmitter or receiver for measuring wavelength. The parallel wires form a transmission line along which standing waves appear. The wavelength is equal to twice the distance between any two consecutive current nodes.

Leclanché cell. A primary cell having a carbon positive electrode and a zinc negative electrode in an electrolyte of sal ammoniac and a depolarizer. The common dry cell.

left-handed elliptically polarized wave. An elliptically polarized wave in which the rotation of the direction of displacement is counterclockwise for an observer looking in the direction the wave is traveling.

left-hand taper. Concentration of the resistance toward the clockwise end of the range of a potentiometer or rheostat, held with the shaft pointing toward the observer.

leg. The part or parts of a filter or an attenuator that form a parallel branch across the circuit.

lens. A transparent object, usually glass, having one or more curved surfaces designed to change the direction of rays of light. Also, a device for focusing radio waves. Also, an electric or magnetic field used to focus the electron stream in a cathode ray tube.

lens disc. A mechanical television scanning disc

in which each opening is fitted with a lens for the purpose of securing greater brilliancy or light concentration.

lens speed. A measure of the amount of light a lens will pass, equal to focal length divided by diameter.

lens turret. A rotating lens mount on a television camera, to which are attached several lenses. It is used for rapidly switching lenses.

Lenz's law. An induced current always opposes the current that produced it.

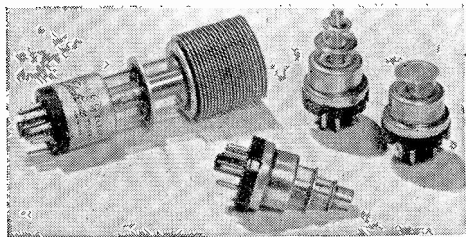
level. A value or amount, as of voltage or power.

level indicator. A volume indicator.

light. Electromagnetic radiations having wavelengths between 4000 and 7000 angstrom units and therefore visible to the eye.

light chopper. A mechanical device for interrupting a light beam.

light flux. The total amount of light produced by a source, usually measured in lumens. Sometimes used to describe invisible radiations such as infra-red and ultra-violet rays.



Lighthouse Tubes

Courtesy GE

lighthouse tube. (So called from its supposed resemblance to the shape of a lighthouse.) A sealed-disc triode in which the grid is a flat wire mesh separated from flat cathode and plate surfaces by only a few thousandths of an inch. Transit time is reduced, permitting use at ultra-high frequencies.

light modulation. Variation in the intensity of light, usually at audio frequencies, for communications or movie sound-track purposes.

lightning arrester. A protective device used to side-track lightning that strikes a receiving or transmitting antenna directly to ground.

lightning switch. A switch with large current-carrying capacity used to connect an antenna to ground, when the antenna is not in use, for lightning protection.

light ray. The direction or path of propagation of light, represented by a straight line.

light relay. A photoelectric device in which a change in light intensity opens or closes a relay.

light-sensitive cell. A device whose electrical characteristics are changed when the amount of light falling on it is changed.

light velocity. All electromagnetic radiations, including those of light, travel in space (in a vacuum) with the same velocity, approximately 186,000 miles per second or 300,000,000 meters per second.

limit bridge. A Wheatstone bridge used for testing resistors. Conformity within tolerances, rather than exact resistance, is determined.

- limiter.** A device whose output is constant for all inputs above a critical value.
- limiting.** The act of removing amplitude variations by a limiter.
- line.** One horizontal scan of the electron beam. Also, a transmission or power line.
- linear.** Having a straight-line characteristic.
- linear amplification.** Amplification over a straight portion of the characteristic curve.
- linear amplifier.** A stage operated over the straight portion of its characteristic curve. Specifically, a transmitter stage used to amplify the modulated wave.
- linear control.** A volume or tone control having uniform distribution of resistance along each unit length of the resistance element.
- linear detection.** Detection in which the audio-frequency output is directly proportional to the radio-frequency input for all normal signals.
- linear distortion.** Distortion independent of the amplitude of voltage or current involved.
- linearity.** In television, the uniform distribution of picture elements along a line or over the total area of the image.
- linearity control.** In television, a control whose adjustment makes the sweep more linear.
- linearly polarized wave.** A transverse wave in which the displacement has a constant direction at a point in space.
- linear power amplifier.** A power amplifier in which the signal output voltage is directly proportional to the signal input voltage.
- linear rectification.** Rectification in which the rectified current or voltage is proportional to the amplitude of the input wave over a wide range of input amplitudes.
- line-balance converter.** A quarter-wave shield, used at the end of a coaxial transmission line to raise the impedance of the outer conductor to permit connecting to a balanced transmission line. A bazooka.
- line cord.** A two-wire cable terminating in a two-prong plug, used for making connection to an ac or dc wall outlet.
- line-cord resistor.** An asbestos-wrapped resistance element incorporated in a line cord for the purpose of dropping the line voltage to the proper value for application to the series-connected tube filaments of a universal ac-dc receiver.
- line drop.** The voltage drop between two points on a power line or transmission line, due to the resistance, reactance, or leakage of the line.
- line equalizer.** A part or parts inserted in a transmission line to correct the frequency-response characteristic of the line.
- line filter.** A device containing one or more choke coils and condensers, inserted between the line cord plug and the power line to block noise signals.
- line flyback.** In a television system, the right-to-left return motion of the electron beam from the end of one line to the beginning of the next. Also called horizontal flyback or horizontal retrace.
- line-frequency blanking pulse.** See *horizontal blanking pulse*.
- line interlacing.** In television, a system of picture scanning in which odd-numbered lines are scanned as one field, and even-numbered lines are scanned as another field.
- line microphone.** A microphone made highly directional by the use of a sound collector consisting of small tubes of different lengths placed flush with the microphone. A machine-gun mike.
- line noise.** Disturbing electrical pulses originating in a transmission line.
- line-of-sight distance.** Straight-line distance from station to horizon. The transmitting range, under normal conditions, of high-frequency stations such as television, FM, and radar.
- line-scanning frequency.** The number of lines scanned each second, equal to the number of scanning lines per frame, multiplied by the frame frequency.
- line sequential.** In color TV, a system in which each line in a field is scanned in a color different from that of the line on either side of it in that same field. Because of line interlacing, the intervening lines are scanned in succeeding fields, so that it requires six fields to scan each line in all the colors.
- lines of force.** Imaginary lines used to designate directions in which electric or magnetic forces act in space.
- line-stabilized oscillator.** An oscillator in which a section of transmission line is used as a sharply selective frequency-controlling element.
- line-synchronizing pulse.** In television, the pulse added to the video signal for the purpose of controlling the horizontal sweep oscillator in the receiver.
- line voltage.** The voltage existing at a wall outlet or other terminals of a power line system. In most of the United States, between 110 and 120 volts.
- line-voltage regulator.** A device that delivers an essentially constant voltage to the load, regardless of minor variations in the input voltage.
- link.** The fusible and replaceable part used in some types of cartridge fuses. Also, a closed circuit containing one or more coils used to couple radio-frequency circuits. Also, a flat strip serving as a removable connector between two terminal screws.
- linkage.** Coupling together by lines of force that pass through both parts.
- link coupling.** The coupling of two circuits by a closed loop consisting of a few turns of wire coupled to an inductance in each circuit, and connected together by a pair of wires or a low-impedance concentric line.
- lip microphone.** A unidirectional microphone held on the upper lip; used where outside noise level is extremely high.
- Lissajous patterns.** Patterns obtained when alternating voltages of various amplitude ratios, frequency ratios, and phase differences are plotted, mechanically traced, or applied to both pairs of deflecting plates in a cathode ray tube.
- litteral number.** A letter or symbol used for representing quantities. Thus, R is a litteral number (sometimes called a general number) when used to represent resistance.
- Litz wire.** A special stranded wire made so that every strand is on the surface for the same distance. Used to reduce the tendency of high-frequency currents to flow near the surface of a conductor rather than through the center.

live. Having a voltage; energized.

live end. The part of a radio studio that gives the greatest reflection of sound.

liven the studio. To remove sound-absorbing material from the studio, push back curtains to expose window and wall surfaces, and set up sound-reflecting screens.

L network. A network composed of two impedance branches, one connected across the circuit and the other in series with the circuit, resembling in a schematic diagram the letter L.

load. That part or combination of parts into which power is fed to accomplish a desired result. Also, the amount of power taken from a circuit.

loaded antenna. An antenna with extra inductance or capacitance in series to increase its electrical length.

loaded Q. The Q of a resonant circuit when an external load is coupled to the circuit.

loading coil. A coil inserted in a circuit to increase its inductance but not to provide coupling with any other circuit.

load line. A line drawn on a graph of Ep-Ip curves to show what the operating conditions will be for a particular load in the tube plate circuit.

lobe. One of the loops in the radiation pattern of an antenna.

lobe switching. Changing the direction in which one or more of the antenna lobes point.

local control. Radio-transmitter control in which the control functions are performed directly at the transmitter.

localizer. A transmitter in an instrument landing system used to lay out an approach course that is a vertical plane perpendicular to the center of the runway. Two signals are transmitted, which when received with equal strength indicate that the airplane is on the proper course.

local oscillator. The oscillator section of a superheterodyne receiver.

locked groove. A blank, endless groove at the end of modulated grooves on a record, to prevent further travel of the phonograph needle. This groove is off-center on most modern phonograph records, to provide an in-and-out motion for actuating the tripping mechanism of an automatic record changer, in which case it is more generally called the eccentric groove.

lock-in. A term describing the condition that exists when a sweep oscillator is in synchronism with the applied sync pulses. Also, a *loctal tube*.

locking relay. A relay that locks into position when its coil is energized momentarily, thus eliminating the need of continual coil energization. A latching relay.

loctal tube. A tube with an 8-pin base that is locked into its socket by a groove on the centering key into which a spring ring in the socket fits. Also called a lock-in or loktal tube.

lodestone. A mineral consisting chiefly of a magnetic oxide of iron that is found in its natural state in a magnetized condition. Also called magnetite.

log. A list of radio stations. A record of stations with which a radio transmitter has been in communication; radio operators are required by law to keep this log. A detailed record de-

scribing the program being broadcast each minute of the operating day by a broadcast station. A record of the meter readings required by law to be taken at regular intervals in a broadcast transmitter and in certain other types of transmitters. Also, abbreviation for *logarithm*.

log⁻¹. Antilogarithm. To be read "A number whose log is."

log₁₀. Logarithm of a number to the base 10, which is the common logarithm of a number.

logs. Logarithm of a number to the base e, which is 2.718 in the natural system of logarithms.

logarithm. The common logarithm of a quantity is the exponent of the power to which the number 10 (the base of the common system of logarithms) must be raised in order to equal the quantity. Thus, 4 is the logarithm of 10,000 (log 10,000 = 4) because 10⁴ is equal to 10,000. In the natural system of logarithms, the base is 2.718, which is designated by the Greek letter e.

logarithmic horn. A horn whose diameter varies with its length according to a logarithmic law.

logarithmic scale. A scale for graphs, on which distances from zero of the scale are proportional to the logarithms of the numbers with which these points on the scale are labeled.

logging. Making a record of the exact dial setting at which a station is received, or making a written record of any other essential data.

loktal tube. See *loctal tube*.

longitude. The distance east or west from a meridian passing through Greenwich, England, measured in degrees, minutes, and seconds.

longitudinal waves. Sound, pressure, and some seismic waves, transmitted through a material medium in which the individual particles of the medium move back and forth in the direction in which the wave progresses. The medium undergoes condensations and rarefactions. Radio waves are not longitudinal, but transverse.

long waves. Wavelengths longer than the longest broadcast band wavelength of 545 meters. Long waves correspond to frequencies between about 15 kilocycles and 550 kilocycles.

long-wire antenna. An antenna whose length is an integral multiple of a half-wavelength. A harmonic antenna.

loop. A closed circuit or path. Also, on a graph, the plot of a variable that forms a hump or closed, curved pattern. Also, another name for *antinode*.

loop antenna. An antenna consisting of one or more complete turns of wire.

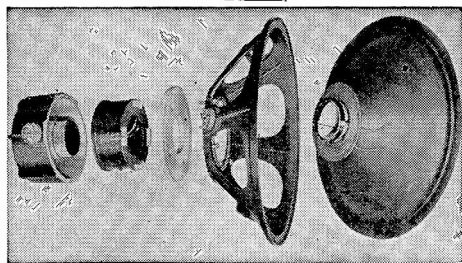
loose coupling. Very little coupling between two coils, so that only a small part of the magnetic flux of one coil links with the other coil.

loran. (Coined from LONG RANGE Navigation.) A system for determining direction and position in which signals from two synchronously operated stations are received and the time difference between their signals is determined. From specially prepared charts this time difference is converted into positional information.

loss. Energy dissipated before it accomplishes useful work.

loudness. The intensity of sound.

loudness level. See *equivalent loudness level*.



Courtesy Jensen

Loudspeaker (Exploded View)

magnal base. An 11-pin base used for cathode ray tubes.

magnesium copper-sulphide rectifier. A dry-disc rectifier consisting of magnesium in contact with copper sulphide.

magnet. A substance or device that attracts other pieces of magnetic material and attracts or repels other magnets. A permanent magnet has this property indefinitely; an electromagnet only when current is flowing through its coil.

magnet gap. The space between the pole faces of a magnet.

magnetic. Pertaining to a magnetized substance, or to a substance capable of being magnetized.

magnetic cartridge. A case or shell containing an electromagnetic device used in a phonograph pickup for converting mechanical movement of the needle into electric energy.

magnetic circuit. A complete path for magnetic lines of force.

magnetic contactor. A magnetically actuated device for opening or closing an electric power circuit.

magnetic cycle. One complete round of changes in the magnetization of an object, corresponding to one cycle of the alternating current producing the magnetization.

magnetic damping. Reduction or elimination of oscillation or vibration by the opposing force produced by eddy currents.

magnetic deflection. A method of bending the electron stream in a cathode ray tube by means of the magnetic field produced by coils placed around the tube.

magnetic density. The number of magnetic lines of force per unit cross-sectional area.

magnetic field. The space around a permanent magnet or a current-carrying conductor or coil where magnetic flux exists.

magnetic field intensity. Magnetizing force or magnetic force.

magnetic figures. A pattern showing the distribution of a magnetic field, made by sprinkling iron filings on a non-magnetic surface in the field.

magnetic flux. Magnetic lines of force.

magnetic flux density. The number of magnetic lines of force per square unit of area.

magnetic focusing. Focusing of an electron beam in a cathode ray tube by the action of a magnetic field.

magnetic keeper. A bar of soft iron placed across the poles of a permanent horseshoe magnet to complete the magnetic circuit when the magnet is not in use, to prevent demagnetization.

magnetic leakage. Passage of magnetic flux outside of the path along which it can do useful work.

magnetic lines of force. Imaginary lines along which magnetic forces are acting in a magnetic field.

magnetic loudspeaker. A loudspeaker consisting essentially of a permanent magnet, a pivoted armature mechanically connected to the diaphragm or cone, and a coil connected to the output stage of a radio receiver or other apparatus. Interaction between the permanent magnetic field and that developed in the armature by the coil results in movement of the armature and production of sound waves by the diaphragm.

loudspeaker. A device for converting electric energy into acoustic energy.

louver. A loudspeaker grille construction in which sloping slats of a cabinet hide the loudspeaker yet allow sound waves to emerge unhindered. Also, a similar construction for ventilating or decorative purposes. Sometimes spelled louver.

low-frequency padder. In a superheterodyne receiver, a semi-adjustable condenser placed in series with the oscillator tuning circuit to adjust the calibration of the circuit at the low-frequency end of the tuning range.

low-level modulation. Modulation at a point in a transmitter where the power level is low compared to that at the output of the transmitter.

low-loss construction. The use of materials or the manner of constructing parts so that there is a minimum of loss.

low-pass filter. A filter network designed to pass all frequencies below a cut-off frequency value, while attenuating or rejecting higher frequencies.

low tension. Low voltage.

L pad. An attenuation network having its elements arranged to resemble the letter L.

lug. A small strip of metal used as a terminal to provide a convenient means for making a soldered connection.

lumen. A unit of light flux. A light source of one candle power emits 12.56 lumens of light.

luminescence. Radiation of light by an object that has previously been exposed to strong light. Emission of light not directly due to heat.

luminous intensity. The candlepower of a source of light.

lumped capacitance. Capacity concentrated in a component, as distinguished from stray or distributed capacity.

lumped constant. A single constant, equivalent electrically to all the distributed constants of that type that exist in a circuit.

lumped impedance. Impedance concentrated in a component, as distinguished from stray or distributed effects.

lumped inductance. Inductance concentrated in a component, as distinguished from stray or distributed inductance.

lumped resistance. Resistance concentrated in a component, as distinguished from stray or distributed resistance.

M

magic eye. See *electron-ray tuning indicator*.

magnetic microphone. A microphone in which the output voltage depends upon variations in the reluctance of a magnetic circuit.

magnetic pickup. A phonograph pickup containing a permanent magnet, one or two coils, an iron armature, and a core structure so arranged that movement of the phonograph needle in the record groove varies the amount of magnetic flux passing through the coils, thereby inducing audio-frequency voltages in the coils.

magnetic poles. Regions in a magnet near which the field is concentrated.

magnetic pole strength. Force exerted on a metallic object by a magnetic pole, measured in unit poles. A unit pole is one that repels a similar pole at a distance of one centimeter with a force of one dyne.

magnetics. The branch of science that deals with the laws of magnetic phenomena.

magnetic saturation. A condition of an iron core in which further increases in magnetizing force produce little increase in magnetic flux.

magnetic sensitivity. The amount of deflection of the electron stream in a cathode ray tube produced by a stated current through the deflection coil.

magnetic shield. An iron housing used with a radio part to prevent external magnetic fields from affecting the part, or to prevent magnetic fields produced by the part from affecting other circuits and parts.

magnetic storm. A rapid and violent fluctuation in the intensity of the earth's magnetic field, disrupting radio and telegraphic communications.

magnetic vane meter. An ac meter containing a metal vane pivoted inside a coil. The vane is magnetized by the coil's magnetic field with such polarity that the vane and attached pointer are caused to rotate to a position that indicates the strength of the alternating current flowing through the meter coil.

magnetism. The ability to attract magnetic materials and to influence moving electrons.

magnetite. Lodestone.

magnetization curve. A curve showing the relation between the magnetizing force H (ampere-turns or gilberts per cm) and the flux density B (lines per sq centimeter). Also called B - H curve.

magnetizing force. See *magnetomotive force*.

magnetomotive force. The force that produces magnetic flux in a magnetic circuit. That which sets up and maintains a magnetic field.

magnetostriiction. The slight change in the size of material when it is magnetized.

magnetostriction oscillator. An oscillator in which the grid and plate circuits are coupled through a rod of magnetic material. The alternate expansion and contraction of the rod with changes in plate current governs the fundamental frequency of the oscillator.

magnetostrictive. Changing in size (dimensions) when placed in a magnetic field.

magnetron. A tube in which the electron flow from a cathode to one or more anodes is influenced by an external magnetic field, and the electric field produced by the anode voltages.

magnetron oscillator. An oscillator using a magnetron, most generally one in which the tube contains cavities that are the circuit components.

magnet wire. Insulated copper wire in sizes commonly used for winding coils in electromagnetic devices.

magnitude. The amount or value of a quantity.

mains. Ordinary power lines.

major lobe. The loop in the radiation pattern of an antenna that is the path of maximum radiation.

manganin. A metal alloy commonly used in rheostats and resistors, because it is not appreciably affected by changes in temperature.

man-made static. High-frequency noise signals produced by sparking in electrical apparatus or power lines and picked up by receivers.

manometer. A pressure-measuring gauge.

mantissa. The part of a logarithm to the right of the decimal point. It is always a decimal and always positive. Example: In $\log 461 = 2.6637$, the mantissa is .6637.

manual tuning. Tuning a receiver to a desired station by rotating the tuning-control knob by hand.

Marconi antenna. An antenna directly connected to ground or close enough to ground so that the ground plays an essential part in the radiation of energy.

marker. See *radio marker beacon*. Also, a bearing or range indication on a radar screen.

marker pip. A frequency index mark used in cathode ray oscilloscope alignment of TV sets and in conjunction with a sweep-driven signal generator. The marker pip is produced by coupling a fixed-frequency oscillator to the output of the signal generator.

marking wave. In telegraphic communication, the wave on which the code characters are being transmitted.

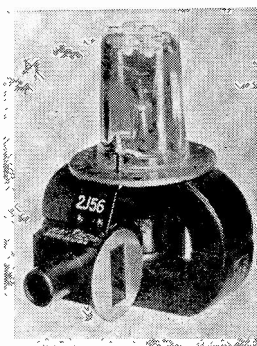
mask. A plastic, metal, or wood covering used to conceal those portions of a picture tube face not being used for reproduction of the image.

masking. The shift of the threshold of audibility of a sound because of the presence of another sound.

masking disc. A baffle used in an electron gun to restrict the cone of electrons to a small size to prevent spherical aberration.

Magnetron

Courtesy
Raytheon Mfg. Co.



Masonite. Fiberboard that consists of wood fibers exploded under steam and compressed into hard sheets.

mass. The property of a body that determines the acceleration it will have when acted upon by a given force.

mast. A vertical pole or structure supporting an antenna.

master. The negative die made from an original wax recording, which is used to produce other dies, from which are made the stamping dies used to produce phonograph records.

master control board. The panel on which all the main operating controls of a broadcast studio or transmitter are located.

master oscillator. The oscillator that establishes the carrier frequency of a transmitter.

master-oscillator power-amplifier. A combination of a vacuum-tube oscillator followed by a radio-frequency amplifier stage.

matched load. A load whose impedance exactly equals the impedance of the source.

matching. Connecting two circuits or parts together in such a way that their impedances are equal.

matching stub. Two wires or a section of transmission line of such a length that, when properly tapped, or when connected to the proper point along a transmission line, will match the impedances of the load and source.

matching transformer. A transformer for matching two or more impedances.

matrix. A negative from which duplicate phonograph records are molded.

matter. Anything that occupies space.

maximum. Greatest quantity or amount of anything.

maximum available power. The power any device can deliver when its source and load impedances are matched.

maximum output. The greatest output power that can occur regardless of distortion.

maximum rated carrier power. The greatest power at which a transmitter can be operated satisfactorily or safely.

maximum undistorted output. The maximum audio power output a receiver or audio amplifier will deliver without having more than a stated amount of total harmonic distortion.

maximum usable frequency. The highest frequency that can be used for reliable radio transmission at a specified time between two points on the earth by reflection from the regular ionized layers of the ionosphere.

maxwell. The unit of magnetic flux, equal to one magnetic line of force.

MAYDAY. The international distress call for radiotelephone communication. It is the phonetic spelling of the French "M'aider," meaning "Help me."

M-derived filter. A filter with infinite attenuation at some specific frequency, producing a sharper cut-off than can be obtained from a standard filter.

mean carrier frequency. The resting frequency or assigned carrier frequency of a frequency-modulation transmission system.

mechanical bandspread. The use of a vernier tuning dial to make a gang tuning condenser rotate more slowly than is possible with the regular tuning-control knob, making station tuning easier in crowded short-wave bands.

mechanical damping. The use of rubber or plastic blocks with the moving parts of a recording cutter or reproducer to absorb undesired vibrations.

mechanical rectifier. A vibrator.

mechanical scanning. Breaking down an image into a number of picture elements by mechanical means such as a Nipkow disc.

mechanical television. Any television system in which the scene to be transmitted is broken up into picture elements, and reconstructed at the receiving end by a mechanical device such as a rotating scanning disc.

megacycle (mc). One million cycles per second.

megatron. See *lighthouse tube*.

megger. A high-range ohmmeter used for measuring leakage resistances and insulation resistances.

megohm (meg). One million ohms.

Meissner oscillator. An oscillator in which the grid and plate circuits are inductively coupled through an independent tank circuit that determines the frequency.

mercury. A heavy, silver-colored metal that is liquid at ordinary room temperatures. When heated, it gives off a vapor that is highly conductive when ionized.

mercury barometer. An instrument in which the pressure of the atmosphere is indicated by the height of a column of mercury.

mercury switch. An electric switch made by placing a large globule of mercury in a glass tube having electrodes arranged in such a way that tilting the tube will cause the mercury to move and make or break the circuit.

mercury-vapor tube. A tube containing a small amount of mercury, which is ionized. The resulting ionization of the mercury-vapor molecules gives a high plate current.

meridian. A great circle on the face of the earth, passing through both poles.

Mershon condenser. An early wet-electrolytic condenser.

meson. A particle having a unit charge like an electron but a mass in between that of electrons and protons. Also called heavy electron, barytron, mesotron, penetron, X particle, etc.

metal detector. An electronic device for locating metal objects.

metallic insulator. A shorted quarter-wave section of a microwave transmission line that acts as an electrical insulator at the frequency for which its length is one quarter wavelength.

metallized resistor. A resistor made by depositing a thin film of high-resistance metal on the surface of a tube or rod made of glass or other insulating material.

metal tube. A vacuum tube having a metal envelope instead of a glass envelope. Electrode connections are made through glass beads fused into the top and the bottom of the metal envelope.

meteograph. An apparatus for recording simultaneously several meteorologic phenomena, such as temperature, moisture, etc.

meter. The unit of length in the metric system. One meter is equal to 3.28 feet. Also an instrument used for making electrical measurements. A voltmeter measures voltage; an ammeter or milliammeter measures current; a wattmeter measures power; an ohmmeter measures resistance.

metric system. A decimal system of measures and weights, using the meter and the gram as basic

units. The system of units based on meters for length, grams for mass.

mho. The unit of conductance, which is the reciprocal of resistance.

mica. A transparent flaky mineral that splits readily into thin sheets and has excellent insulating and heat-resisting qualities, used extensively to separate the plates of condensers, to insulate electrode elements of vacuum tubes, and for other insulating purposes in radio apparatus.

mica condenser. A condenser using sheets of mica as the dielectric material that insulates adjacent plates from each other.

Micarta. An insulating material made by compressing mica and a binding material such as Bakelite.

micro. Prefix meaning one millionth of. Abbreviated μ (Greek letter mu) or m.

microammeter. A meter designed to measure extremely small currents.

microampere (μ a). A unit of current, one millionth of an ampere.

microfarad (mfd). A unit of capacity, one millionth of a farad.

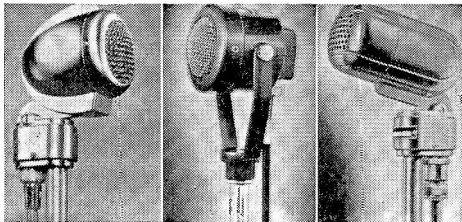
microhenry. A unit of inductance, one millionth of a henry.

micromho. A unit of conductance, one millionth of a mho.

micromicro. A prefix meaning one millionth of one millionth of. Abbreviated $\mu\mu$ (the Greek letter mu) or mm.

micromicrofarad (mmf). A unit of capacity, one millionth of a microfarad.

micron. A unit used to express wavelengths of light. One micron is equal to 10,000 angstrom units or .0001 cm.



Courtesy The Turner Co.

Microphones

microphone. A device that converts sound waves into corresponding audio-frequency electrical energy. It contains some form of flexible diaphragm that moves in accordance with sound-wave variations to generate a voltage.

microphone adapter. A device that slips under a tube or is otherwise connected to a radio receiver, providing terminals to which a microphone can be connected to convert the receiver into a public-address system.

microphone button. A button-shaped container filled with carbon particles. When attached to the diaphragm of a microphone, the resistance between the terminals of the button varies in accordance with movements of the diaphragm.

microphone cable. The group of wires connecting a microphone to an amplifier or mixer.

microphone preamplifier. An audio amplifier that amplifies the output of a microphone so that the audio signal can be sent over a transmission line to the main amplifier.

microphone stand. A table or floor stand used to support a microphone in a desired position.

microphone transformer. The iron-core of transformer that couples the microphone to a microphone amplifier, to a transmission line, or to the input circuit of the main audio amplifier.

microphonic. A condition in which mechanical movement of some radio part other than a microphone causes variations in circuit current.

microsecond. One millionth of a second.

microswitch. A switch in which a very small movement of its actuating plunger suffices to change the switch from on to off or vice versa.

microvolt. One millionth of a volt.

microvoltmeter. A highly sensitive voltmeter that indicates differences of potential in microvolts.

microvolts per meter. A measure of radio field intensity, equal to the signal strength at the antenna in microvolts divided by the effective height of the antenna in meters.

microwave. A very short electromagnetic wave, having a wavelength less than one meter.

microwave oscillator. An oscillator that generates a frequency higher than 300 megacycles (less than one meter).

microwave relays. A system of increasing the range of television coverage by reception and rebroadcast of the signal over a chain of towers located 10 to 25 miles apart. Each tower contains a receiver to pick up the signal and a transmitter to rebroadcast it, operating in the part of the microwave region from 3000 to 30,000 mc.

mike. Microphone.

mil. A unit of measurement equal to one thousandth of an inch (.001 inch).

mil-foot. A wire one foot long having a diameter of one mil.

Miller effect. The reflection across the input of the grid-plate capacity increased by a factor determined by the stage gain and the phase angle of the load voltage with respect to the equivalent ac plate voltage.

milli. Prefix meaning one thousandth of. Abbreviated m or k.

milliammeter. A meter that indicates current flow in milliamperes.

milliampere (ma). A unit of current, one thousandth of an ampere.

millihenry. A unit of inductance, one thousandth of a henry.

millimeter. A metric unit of length, one thousandth of a meter. One millimeter is approximately equal to one twenty-fifth of an inch.

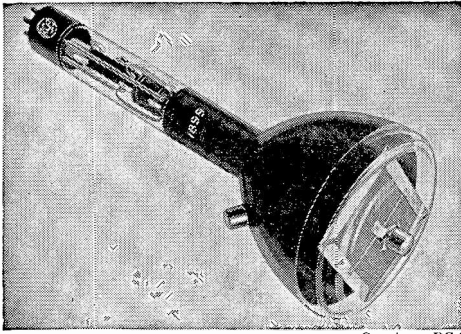
millimicron. A unit of length, one thousandth of a micron, or one millionth of a millimeter.

millivolt. A unit of voltage, one thousandth of a volt.

millivoltmeter. A voltmeter that indicates voltage in millivolts.

milliwatt. A unit of power equal to one thousandth of a watt.

- minimum.** Lowest, least, or smallest quantity of anything.
- minor lobe.** Any lobe except the major lobe in a radiation pattern of an antenna.
- minus sign.** A sign (—) used in mathematics to indicate subtraction or a negative value. Used in radio to indicate the negative terminal of a voltage source, or negative polarity.
- minute.** One-sixtieth part of a degree. One complete revolution of an angle-generating line is 360°, which is 360×60 or 21,600 minutes.
- mismatch.** The condition in which the impedance of a source does not match or equal the impedance of the connected load.
- mixed-high frequencies.** The part of the television color signal that carries the finer details (high frequencies) of the transmitted image.
- mixer.** A control that permits combining the output signals of two or more of signal sources in any desired proportion before these signals are fed to the input of the main af amplifier. Also, popularly, a mixer-first detector.
- mixer-first detector.** The stage in a superheterodyne receiver in which the incoming modulated rf signals are combined with the local oscillator signals to produce the i-f signal.
- mixing.** Feeding two or more signals to the same circuit.
- mobile receiver.** A receiver designed to be operated while in motion.
- mobile station.** A radio station operated from a movable location such as an automobile, fire truck, train, ship, or airplane.
- mobile transmitter.** A transmitter designed to be operated while in motion and normally so operated.
- mode.** One of the methods of operation of a microwave system that will produce usable signals.
- mode number.** The number of whole cycles during which a mean-speed electron remains in the drift space of a reflex klystron.
- modulate.** To vary the amplitude, frequency, or phase of a signal.
- modulated amplifier.** See *modulated stage*.
- modulated continuous wave (mcw).** In telegraphy, emission in which the carrier is modulated by a constant audio-frequency tone.
- modulated stage.** A transmitter stage in which the frequency, phase, or amplitude of a signal to be modulated is changed in accordance with the modulating signal.
- modulated wave.** A radio wave that varies either in frequency, in phase, or in amplitude in accordance with the wave form of the intelligence signal being transmitted.
- modulating electrode.** An electrode used in a cathode-ray tube to control the beam current.
- modulating wave.** The af signal, picture signal, facsimile signal, or code signal that is made to modulate the carrier wave of a transmitter.
- modulation.** Changing the amplitude, phase, or frequency of one wave in accordance with some characteristic of another wave. In amplitude modulation, the amplitude of the modulated wave varies in step with the amplitude variations in the modulating wave at a rate determined by the frequency of the modulating wave. In phase modulation, the phase of successive peaks of the modulated wave varies in step with the amplitude variation of the modulating wave at a rate determined by the frequency of the modulating wave. In frequency modulation, the frequency of the modulated wave varies in step with the amplitude variations of the modulating wave at a rate determined by the frequency of the modulating wave.
- modulation capability.** The maximum percentage modulation that is possible without objectionable distortion.
- modulation distortion.** Distortion of wave form due to a greater plate-current change on one half-cycle than on the other half-cycle.
- modulation envelope.** A curve drawn through the peaks of a graph showing the wave form of a modulated rf carrier signal.
- modulation factor.** The ratio of the maximum amplitude of the modulation envelope to the amplitude of the unmodulated carrier. Multiplying this factor by 100 gives the percentage of modulation.
- modulation grid.** An electrode used between the cathode and focusing electrodes in a cathode-ray tube to control the amount of emission and thereby the brilliance of the spot.
- modulation index.** See *modulation factor*.
- modulation monitor.** An instrument used to provide a continuous indication of the modulation percentage at a transmitter.
- modulation percentage.** The ratio of the modulating voltage to carrier voltage, expressed in per cent.
- modulator.** A transmitter stage that supplies the modulating signal.
- molded condenser.** A condenser cast in Bakelite or other insulating material to keep out dust and moisture.
- molecular theory of magnetism.** The theory that treats each molecule of matter as a complete permanent magnet. When a piece of material is magnetized, all the molecular magnets line up with like poles pointing in the same direction.
- molecule.** The atom or group of atoms that constitutes the smallest particle in which a compound or material can exist separately.
- molybdenum.** A metallic element of the chromium group used in the manufacture of tubes.
- monitor.** A person who checks the quality of a radio or television program at the studio or transmitter. Also, a receiver used in checking or monitoring programs.
- monitoring.** The act of listening to or observing a program either during rehearsals or actual broadcasts, to check quality and set the levels for proper sound or visual effects.
- monitor oscilloscope.** An oscilloscope whose time base is permanently set at line or frame frequency, or a sub-multiple of either, for continuous indication of the video voltages of a transmission.
- monitor panel.** A group of controls used to govern the level of sound signals from a studio, or of television video signals.
- monkey chatter.** Garbled speech or music heard along with a program, occurring when the side frequencies of an adjacent-channel station beat with the desired station signal.
- monochromatic.** Of or pertaining to one color only.
- monoscope.** A cathode-ray tube that produces fixed television picture signals corresponding to the design or picture that has been printed on its screen.



Monoscope

Courtesy RCA

Moving Target Indicator (MTI). An electronic device that will permit only moving targets to show on a radar scope.

μ factor. The ratio of the change in one electrode voltage to the change in another electrode voltage when the current and all other electrode voltages are maintained constant. For example, the *amplification factor*.

multi-band antenna. An antenna that can be used with satisfactory results on a number of frequency bands.

multi-channel transmitter. A transmitter having two or more complete radio-frequency sections capable of operating on different frequencies either individually or simultaneously.

multielectrode tube. A vacuum tube having more than three electrodes associated with a single electron stream.

multi-frequency transmitter. A radio transmitter capable of operating on two or more selectable frequencies, one at a time, using preset adjustments.

multigrid tube. A vacuum tube having more than one grid electrode.

multimeter. A test instrument having provisions for measuring voltages, currents, and resistance.

multipath reception. The reception of a direct wave from the transmitter accompanied by one of more reflected waves. See *ghost* and *echo*.

multiple connection. The connecting of two or more devices in parallel.

multiple-contact switch. A switch in which the movable contact can be set to any one of a number of different fixed contacts.

multiple modulation. Modulation in which a carrier wave of one frequency is modulated by an intelligence signal, and the resultant wave is then made to modulate a second carrier wave having a second frequency, etc.

multiple scanning. The process of scanning an image in two or more individual fields, each containing a fraction of the total picture information. *Interlaced scanning*.

multiple-tuned antenna. An antenna connected to ground through tuning coils or condensers at more than one point, so that the total of the reactance in parallel will make the antenna resonant at the desired frequency.

multiple-unit tube. A vacuum tube having two or more groups of electrodes in a single envelope, each with its own electron stream.

multiplex operation. Simultaneous transmission of two or more messages in either or both directions over the same transmission path in a telegraph system.

multiplex radio transmission. The simultaneous transmission of two or more signals using a common carrier wave.

multiplication. The process of determining by a briefer computation the result of adding any given number or quantity a certain number of times. Thus, 3×4 is 4 added together 3 times, or $4 + 4 + 4$. Multiplication is indicated by the sign \times . In algebra, the multiplication sign is usually omitted between general numbers (numbers expressed by letters), or the symbol \cdot is used to denote multiplication. Examples: $I \times R$, IR , and $I \cdot R$ all mean that I is to be multiplied by R ; $2\pi fL$ means 2 times π times f times L . In algebra, the product of two numbers having like signs is positive. The product of two numbers having unlike signs is negative.

monotron. A monoscope.

Morse Code. A system of dot and dash signals used in the transmission of messages by radio or wire telegraphy. The International Morse Code is used universally for radiotelegraphy, and the American Morse Code is used only for wire telegraphy in the United States.

Morse sounder. A telegraph receiving instrument that produces an audible sound at the beginning and end of each dot and dash. From these sounds a trained operator can read the message.

mosaic. The light-sensitive surface of an iconoscope, consisting of millions of tiny silver globules on a sheet of ruby mica, each globule treated with caesium vapor to make it photosensitive.

mother. A positive recording produced directly from the metal master or negative.

motion-picture pickup. Use of a television camera to pick up scenes directly from motion-picture film.

motor. A machine that converts electrical energy into mechanical energy. It consists essentially of a large number of conductors mounted on an armature that rotates in a magnetic field.

motorboating. Regeneration occurring at a low audio frequency in a radio receiver or audio amplifier, resulting in putt-putt sounds resembling those made by a motorboat.

motor-generator. An electric motor directly connected to one or more generators for the purpose of converting one voltage to another voltage or frequency.

mouth. The large end of a horn loudspeaker.

moving-coil instrument. Any instrument in which the moving system is a coil that carries the pointer or mirror or other indicating device.

moving-coil loudspeaker. A loudspeaker in which the mechanical forces acting on the diaphragm are produced by interaction between the magnetic field of the moving conductors (voice coil) and the steady applied magnetic field produced by a field coil or permanent magnet.

moving-coil meter. See *moving-coil instrument*.

moving-coil microphone. A moving-conductor microphone in which the conductor is a coil located in a strong magnetic field produced by a permanent magnet. A *dynamic microphone*.

moving-conductor microphone. A general term applying to all microphones in which the output voltage depends upon motion of a conductor in a magnetic field.

- multiplier.** A resistor used in series with a voltmeter to increase the range of the meter.
- multiplier tube.** A tube in which emitted electrons are pulled along by increasingly higher potentials and are made to strike a number of plates (called dynodes) successively. At each plate, secondary emission occurs, resulting in a high current from the last plate and giving the effect of high gain.
- multipolar.** Having more than one pair of magnetic poles.
- multivibrator.** A relaxation oscillator consisting of two tubes connected so that energy from the plate circuits is fed to the opposite grid circuits at the proper time and in the proper phase to produce the desired output signal.
- muting.** Silencing, or reducing in volume.
- muting switch.** Device used in automatic-tuning systems to silence the audio system while stations are being selected or tuned in.
- mutual conductance.** The ratio of the change in plate current to the change in grid potential producing it, under the condition of constant plate voltage. See *transconductance*.
- mutual inductance.** The common property of two associated coils or electric circuits that determines how much electromotive force will be induced in one by a change of current in the other. Mutual inductance is measured in henrys, and is designated by the letter M.
- mutual induction.** The generation of a voltage in one circuit by the varying current in another circuit when inductive coupling exists.
- Mycalex.** A hard, molded insulating material consisting chiefly of ground mica and lead borate.

N

- National Electric Code.** A set of rules governing construction and installation of electrical apparatus, as approved by the National Board of Fire Underwriters.
- natural frequency.** The fundamental resonant frequency of a coil-condenser circuit, not a harmonic frequency.
- natural frequency of an antenna.** The fundamental resonant frequency of an antenna alone (without added inductance or capacity).
- natural wavelength.** The wavelength corresponding to the natural frequency of a circuit.
- nautical mile.** The length of a minute along a great circle on the earth. A U. S. land mile is .8684 of a nautical mile.
- needle.** The part of a phonograph pickup that converts the variations in the record grooves into mechanical movements, which are in turn converted into audio frequency signals.
- needle pressure.** Effective weight of the tone arm and pickup on the phonograph record at the point of contact (needle point).
- needle scratch.** Noise components in the output of a phonograph pickup due to the friction of the needle riding in the groove.
- needle talk.** Sounds produced by vibrations of the phonograph needle and/or other associated parts of a phono pickup, heard directly from the pickup, not through the amplifier. Also called needle chatter.
- negative.** Having more electrons than normal, or more than some reference point. Also, in the numerical scale, a number below zero.
- negative bias.** A voltage that makes the control grid of a radio tube negative with respect to the cathode.
- negative charge.** More than the normal number of electrons.
- negative feedback.** Degeneration, which decreases the amplification. Also called *inverse feedback* or stabilized feedback.
- negative ghosts.** Duplicate images that appear on a television screen with intensity variations opposite to those of the picture.
- negative image.** A reversed television image in which the dark portions of the televised scene appear bright, and the bright portions dark.
- negative modulation.** In television, a method of transmission in which a decrease in scene illumination causes an increase in the radiated power of the transmitter. In an AM facsimile system, that form of modulation in which the maximum transmitted power corresponds to the maximum density of the subject copy. In an FM facsimile system, the form of modulation in which the highest transmitter frequency corresponds to the maximum density of the subject copy.
- negative picture phase.** A condition wherein increases in brilliancy make the television picture signal voltage swing in a negative direction.
- negative resistance.** A characteristic of an electric arc, or, to a limited degree, of vacuum tubes, wherein an increase in voltage produces a decrease in current.
- negative-resistance oscillator.** A tube operated on its negative resistance characteristic so that it delivers energy to a tank circuit to produce oscillation.
- negative terminal.** A terminal having more than the normal number of electrons, or one having more electrons than another to which it is being compared.
- negative transmission.** The transmission of television signals in such a way that a decrease in initial light intensity causes an increase in the transmitted power.
- neon.** A gas used in electronic tubes. It produces a characteristic red glow when ionized.
- neon glow lamp.** A neon-filled gaseous tube having a glass envelope through which can be seen the characteristic red glow of neon when ionization occurs during operation of the tube.
- neon oscillator.** A *relaxation oscillator* using a neon glow lamp instead of a vacuum tube to discharge the condenser.
- neper.** A unit of power gain or loss using the natural system of logarithms as its base, replaced by the decibel and volume unit.
- network.** Any complex electrical circuit. Also, a group of broadcasting stations connected together by radio or wire telephone lines so that all stations can broadcast a program originating at one of the stations.
- neutral.** An object that has its normal number of electrons and therefore is uncharged electrically.
- neutralization.** Any process that balances out or prevents an undesirable effect. Specifically, preventing oscillation in an amplifier by introducing a voltage into the input equal in magnitude but opposite in phase to the feedback through the interelectrode capacitance.
- neutralizing condenser.** A variable condenser used in transmitting and receiving circuits to feed a portion of the ac plate voltage back to the grid circuit for neutralizing purposes.

neutralizing indicator. A device for indicating the degree of neutralization of an amplifier.

neutralizing tool. See *aligning tool*.

neutralizing voltage. The ac voltage fed from the grid circuit to the plate circuit (or vice versa), deliberately made 180° out of phase with and equal in amplitude to the ac voltage transferred through undesired paths, usually the grid-plate tube capacitance.

neutral wire. The middle wire of a three-wire, two-phase power line, usually grounded.

neurodyne circuit. A circuit in which a portion of the rf plate voltage is fed back into the grid circuit 180° out of phase to reduce the tendency toward oscillation.

neutron. An electrically neutral particle having about the same mass as a proton.

Nichrome. An alloy of nickel, iron, and chromium that has a high resistance per volume unit and is capable of withstanding high temperatures.

Nicol prism. Two prisms of Iceland Spar crystal cemented together with Canada balsam, used to polarize light.

night errors. Errors introduced by variations in terrain, time of day, season of year, different transmission characteristics, etc., that affect bearings taken with loop antennas of radio direction finders.

Nipkow disc. A flat round plate having one or more spirals of holes around the outer edge, used in mechanical television scanning.

noctovision. A television system using optically invisible rays, usually infra-red, for scanning purposes at the transmitter.

nodal point keying. A method of keying an arc transmitter in which the transmitting key connects to a point in the antenna circuit that is essentially at ground potential at all times.

node. Any point, line, or surface that has zero amplitude.

noise. Any unwanted sounds or electrical disturbance interfering with the desired program. In television, an interfering voltage producing a grainy or streaked picture.

noise filter. A device inserted between a wall outlet and the power cord plug of a receiver to block noise interference that might otherwise enter the receiver. Noise filters are also placed between the power line and the device producing the noise, to prevent escape of the noise signals into the power line.

noise level. The strength of noise signals in a circuit, or of acoustic noise in a particular location.

noise limiter. A circuit that limits the effects of interfering noises by cutting off all noise peaks stronger than the highest signal peak being received.

noise-reducing antenna system. An antenna system in which the only part capable of picking up signals is the antenna proper, this being erected high enough to be out of the noise-interference zone. The lead-in is a shielded cable of twisted two-wire line that can pass through the interference zone without picking up noise signals.

noise silencer. See *scquelch circuit*.

nomograph. A chart or graph containing a series of scales on which equations can be solved by placing a ruler on two known values and reading the answer where the ruler intersects the scale for the unknown value. Also known as a nomogram.

non-conductor. Any material that offers very high opposition to the flow of electricity. An insulating material.

non-corrosive flux. Flux that is free from acid and other substances that might cause corrosion.

non-homing tuning system. A motor-driven automatic tuning system in which the direction of motor rotation is reversed at the ends of the tuning range. When a station-selecting button is pressed, the motor will rotate in the direction in which it was last rotating. If the dial setting for the desired station is in the other direction, the motor will rotate the tuning mechanism to the end of the scale and will then reverse and proceed to tune the receiver to the desired station frequency.

non-inductive circuit. A circuit having practically no inductance.

non-inductive condenser. A condenser having practically no inductance. The layers of foil and paper are staggered in winding so that one layer of foil protrudes at one end, and the other layer protrudes at the other end, so the leads make contact to the entire edge of the foil strips rather than just one end.

non-inductive load. A load having practically no inductance.

non-inductive resistor. A wire-wound resistor so constructed that the wire coil has practically no inductance. Used at high frequencies.

non-inductive winding. A method of winding so that the magnetic field about a turn cancels the field produced about the next adjacent turn. Used in making non-inductive resistors.

non-linear. Not proportional.

non-linear detection. Square-law detection. Detection in which the operating point is at the point of maximum curvature of the tube characteristic.

non-linearity. The crowding of television picture elements in the horizontal direction or crowding of lines at top or bottom due to a distortion of the sweep sawtooth.

non-magnetic. Pertaining to materials such as glass, wood, copper, brass, and paper which are not affected by magnetic fields.

non-resonant line. A transmission line of any length having terminating devices matching the surge impedance so that there are no reflected (standing) waves. Also a transmission line having a physical length much shorter than a quarter wavelength at the operating frequency so that the distributed voltage and current are practically uniform.

non-shorting contact switch. A selector switch in which the width of the movable contact is less than the distance between contacts.

non-storage camera tube. A television camera tube that produces a picture signal proportional at any instant to the intensity of the illumination on the corresponding elemental area of the scene.

non-synchronous vibrator. A vibrator that only interrupts a direct current, without rectifying the resulting stepped-up ac pulses.

normal. The perpendicular to the point of contact. Also, the expected or regular value.

north pole. The pole of a magnet from which the magnetic lines of force leave.

Novachord. An electronic musical instrument that creates the sounds by means of oscillator and amplifier circuits.

noval socket. A tube socket with openings for nine pins.

nucleonics. The science dealing with phenomena associated with the atom nucleus.

nucleus. The central portion of an atom, consisting of a proton alone or various combinations of electrons and protons. The plural is nuclei.

null. Zero.

null indicator. Any device that will indicate when the current is zero.

null method. Any method of measurement in which the reading is taken at zero.

number. One or more written or printed characters used to express an amount of units.

numeral. One or more written or printed characters used to express a number. Example: Arabic numerals 1, 2, 3, etc. Roman numerals I, V, X, etc.

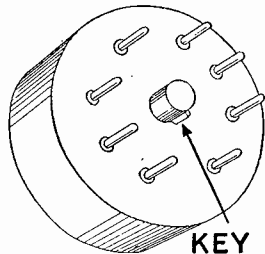
numerator. The part of a common fraction written above the line. Example: In $1/2$, the numerator is 1.



obsolescence-free. Not liable to become out of date because of new developments or new inventions.

obtuse angle. An angle that is greater than a right angle (greater than 90°).

octal base. A tube socket base having eight equally spaced prongs and a central aligning key.



Octal Base

octal socket. A tube socket with openings for eight equally spaced pins, and a slot for a central aligning key.

octode. A vacuum tube having eight electrodes.

oersted. Unit of magnetic intensity or magnetizing force equal to one gilbert in one centimeter. Also, formerly the unit of magnetic force of one gilbert divided by a flux of one maxwell.

ohm. The unit of resistance. The resistance of a device is one ohm when a dc voltage of one volt will send a current of one ampere through that device. The Greek letter omega (Ω or ω) is commonly used to represent ohm.

ohmic value. The resistance in ohms that a part or circuit offers to the flow of current.

ohmmeter. A test instrument that measures and indicates directly the resistance of a part or the resistance between any two points in a circuit.

Ohm's Law. A fundamental electrical law that expresses the relationship between voltage, current, and resistance in a direct current circuit,

or the relationship between voltage, current, and impedance in an ac circuit. The three forms of the law in each case are given below, in which E is the pressure in volts, I is the current in amperes, R is the resistance in ohms, and Z is the impedance in ohms.

DC FORMS	AC FORMS
$E = I \times R$	$E = I \times Z$
$I = E \div R$	$I = E \div Z$
$R = E \div I$	$Z = E \div I$

ohms-per-volt. A sensitivity rating for meters, obtained by dividing the resistance (of the meter and multiplier resistors) by the full-scale voltage value. The higher the ohms-per-volt rating, the more sensitive is the meter.

omnidirectional. In or from all directions, as the radiation pattern of a vertical antenna.

omnigraph. An instrument for producing Morse Code messages for instruction purposes by means of a buzzer and perforated tape.

O network. A network composed of four impedance branches connected in series to form a closed circuit similar to a squared letter "O."

opaque. Preventing the passage of light rays.

open circuit. A circuit that is not electrically continuous, that is, one in which current cannot flow.

open-circuit jack. A jack whose circuit contacts are normally open and are closeable only through a properly connected plug.

open core. In iron core inside a coil without an external path, so that the magnetic circuit has a long path through air.

open-wire transmission line. A transmission line formed by two parallel wires, held apart by spacers.

operating angle. In an amplifier, the portion of a cycle during which plate current flows.

operating point. The point on a grid-voltage plate-current characteristic curve of a tube that corresponds to the dc grid bias value and dc plate current value for operating conditions.

operating power. The power that is actually supplied to the transmitting antenna.

operating voltages. The dc voltages applied to the filament, plate, screen grid, and control grid elements of a tube to establish its operating characteristics.

operator. A person whose duties include the adjustment, maintenance, and operation of transmitting equipment.

opposite side. In a right triangle, the side opposite an acute angle.

optical pattern. See *Christmas tree pattern*.

optical twinning. A defect occurring in natural quartz crystals resulting in small regions of unusable material.

optics. The science that treats of the phenomena of light.

optimum. Best possible.

optimum coupling. That amount of coupling between two circuits that gives maximum transfer of signal energy.

orbital multiplier. A thermionic secondary emission tube in which electrons given off from the two sides of a disc cathode are accelerated and bent into two semi-circular paths that converge on a dynode from which the secondary electrons are collected on a plate.

ordinary wave. One of two components into which

- a radio wave is split in the ionosphere by the earth's magnetic field. The O wave. See *extraordinary wave*.
- ordinate.** The coordinate that specifies distance in a vertical direction on an ordinary graph.
- orient.** To turn or adjust in a definite direction with respect to some reference.
- orthicon.** A television pickup tube using a low-velocity scanning beam so that secondary emission from the caesium-silver globules is reduced.
- orthiconoscope.** See *orthicon*.
- oscillating current.** A current that alternately increases and decreases in magnitude and reverses polarity with respect to time in a definite pattern.
- oscillation.** The condition of oscillating.
- oscillator.** The stage in a receiver, transmitter, or other apparatus in which a vacuum tube and associated parts generate alternating current energy when fed with direct current energy. Also, a signal generator used by servicemen.
- oscillator harmonic interference.** The result of interaction between incoming signals and harmonics of the local oscillator (usually the second harmonic) in a superheterodyne receiver.
- oscillator-mixer-first detector.** A single stage that combines the functions of the local oscillator and the mixer-first detector in a superheterodyne receiver.
- oscillator padder.** An adjustable condenser in series with the oscillator tank circuit of a superheterodyne receiver, used to make possible better tracking between oscillator and preselector at the low-frequency end of the tuning dial.
- oscillatory circuit.** A circuit containing inductance and capacity having values such that a voltage pulse will produce an oscillatory (alternating) current.
- oscillogram.** The recorded trace or permanent record produced by an oscillograph.
- oscillograph.** A test instrument that records the wave form of a varying current or voltage. Also, loosely, an oscilloscope.
- oscilloscope.** A test instrument that shows visually on a screen the wave form of a varying current or voltage.
- osophone.** A telephone receiver for use by the deaf. It applies sound vibrations directly to the bones of the head.
- outlet.** A set of terminals to which a device may be connected. For example, the wall outlet from which electric power can be obtained.
- out of phase.** Having wave forms that do not pass through corresponding values at a particular instant.
- out of sync.** Not synchronized. Television or facsimile reception, in which the line or frame sweeps or both are not in step with the transmitted signals.
- output.** The useful electrical energy delivered by a signal or power source.
- output capacitance.** The sum of the direct capacitances between the output electrode (usually the plate) and all other electrodes that connect directly or indirectly to the other side of the circuit.
- output impedance.** The impedance as measured between the output terminals of an electronic device, receiver, or amplifier at a definite frequency.
- output indicator.** A meter, tuning eye, or other device used to show changes in output.
- output meter.** A meter connected to the output of a receiver or amplifier for the purpose of measuring the output signal strength.
- output stage.** The final stage in a receiver or amplifier.
- output transformer.** An iron-core transformer used to provide efficient coupling between the output stage of a receiver or amplifier and its load.
- output tube.** See *power output tube*.
- overcutting.** Defective recording caused by excessive swing of the cutting stylus due to excessive signal level.
- overlap.** The amount by which the effective height of the scanning spot exceeds the nominal width of the scanning line in a facsimile system.
- overload.** A load greater than that which an electrical device is designed to carry.
- overload capacity.** The current, voltage, or power level beyond which permanent damage occurs to an electrical device.
- overload relay.** A relay that opens a circuit automatically when current becomes excessive.
- over-modulation.** Modulation greater than 100%, resulting in distortion because the carrier is cut off during portions of each modulating cycle.
- overshoot.** A peak, spike, or sharp rise beyond the desired terminating point on a square or pulsed wave.
- overtone.** A harmonic of a fundamental sound frequency.
- oxide.** A combination of an element with oxygen. Rust is an oxide of iron.
- oxide-coated cathode.** A cathode that has been coated with oxides of alkaline-earth metals to improve electron emission at moderate temperatures.
- oxide-coated filament.** A filament coated with a metallic oxide to increase the electron emission.

P

- pad.** A network of resistors, sometimes variable, inserted in a circuit to introduce a loss. Used where input and output impedances must be matched or maintained constant.
- padder.** In a superheterodyne receiver, the trimmer condenser placed in series with the oscillator tuning circuit to control the receiver calibration at the low-frequency end of the tuning range.
- pairing.** Imperfect interlace of lines composing the two fields of one frame of a television picture. Instead of having the proper equal spacing, the lines appear in groups of two.
- pan.** To move a television camera vertically and/or horizontally to keep it trained on a moving object or secure a panoramic effect.
- panel.** A board on which the operating controls of a radio device are mounted.
- panoramic receiver.** A radio receiver that permits continuous observation on a cathode-ray tube

screen of the presence and relative strength of all signals within a wide frequency range.

paper condenser. A fixed condenser consisting of foil plates separated by paraffined or oiled paper.

parabola. A wave shape in the form of a conic section resulting from the intersection of a cone with a plane parallel to its side. Also a *parabolic reflector*.

parabolic microphone. A microphone placed at the focal point of a parabolic sound reflector.

parabolic reflector. A device for collecting light, sound, or radio waves and focusing them to a single point, or for reflecting them in beams consisting of parallel rays.

para-curve cone. A loudspeaker diaphragm having a paraboloidal shape, used to secure piston action whereby the entire cone moves as a unit. Sometimes called curvilinear cone.

parallel. Connected so that current can flow through two or more paths. Also, equally distant and never meeting, as parallel lines. Also, one of the imaginary circles on the surface of the earth parallel to the equator, marking latitude.

parallel cut. A Y cut in a quartz crystal.

parallel-plate oscillator. A push-pull ultra-high-frequency oscillator circuit in which two parallel metal plates form the tank circuit that determines the frequency.

parallel resonant circuit. A tuning circuit consisting of an inductance and a capacity connected in parallel with the source.

parallel-rod oscillator. A microwave oscillator whose grid and plate tank circuits are formed of parallel rods, wires, or pipes.

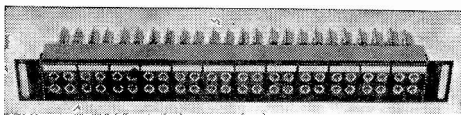
parameter. A variable (or changing quantity) that can be used to find other variables.

parasitic element. An antenna director or reflector that receives its excitation by induction or direct radiation from the driven element, and that reradiates the energy in the proper phase relationship to get the desired results.

parasitic oscillations. Unintended self-sustaining oscillations or transient pulses in a circuit.

parasitic suppressor. A combination of inductance and resistance inserted in the grid circuit of an amplifier to suppress parasitic oscillations.

patchboard. A panel containing a series of single or double jacks at which various circuits are terminated. The circuits are interconnected by short cables called patchcords.



Courtesy Gates Radio Co.

Patchboard

patchcord. A short two- or three-conductor cable with male plugs at each end, used to interconnect various circuits terminated at a control panel, or patchboard.

peak. The maximum instantaneous value of a varying voltage or current.

peak forward anode voltage. The maximum instantaneous plate-cathode voltage in the direction in which a vacuum tube is designed to pass current.

peaking. Providing more amplification for the high frequencies than for the low, used in compensating for loss of high frequencies.

peaking coil. A small coil placed in an amplifying circuit to increase response at certain frequencies. Specifically, an inductance used in a video amplifier to resonate with the circuit capacitance beyond the upper limit of the band and thus compensate for high-frequency loss of gain and to correct the amplifier phase shift.

peak inverse anode voltage. The maximum instantaneous plate-cathode voltage in the direction opposite to that in which a tube is designed to pass current.

peak load. The maximum current consumed or produced in a stated period of time.

peak plate current. The maximum instantaneous plate current flowing in a tube.

peak response. Maximum response.

peaks. Momentary high volume levels produced during a program as a natural result of changes in pitch, accent, or speech emphasis, causing the volume indicator to swing upward. Also rises in the response characteristic of an amplifier.

peak-to-peak voltage. The voltage amplitude between the maximum positive and maximum negative peaks of an ac signal. For a sine wave, this is twice the peak voltage or is 2.82 times the rms voltage.

peak voltmeter. A voltmeter that indicates the peak value of a voltage.

pedestal. The constant voltage value existing just before and after the synchronizing pulses occur in a television signal.

penetration frequency. The highest frequency at which a radio wave traveling vertically upward will still be reflected regularly by a particular ionized layer of the ionosphere. Also called the critical frequency.

pentagrid converter. A pentagrid tube used as a mixer-detector in a superheterodyne receiver.

pentagrid tube. A tube having five grids.

pentatron. A five-electrode vacuum tube containing two anodes.

pentode. A vacuum tube having five electrodes.

percentage modulation. In an amplitude-modulated wave, the ratio of half the difference between the maximum and minimum amplitudes of the modulated wave to the average amplitude, multiplied by 100 to express it as a percentage. In a frequency-modulated wave, the ratio of the actual frequency deviation to the frequency deviation required for 100% modulation, multiplied by 100 to express it as a percentage.

percentage modulation meter. An instrument used to measure the percentage of modulation of a transmitter. It may be a meter or a cathode-ray oscilloscope.

percent ripple. The ratio of the rms ripple voltage value to the average dc voltage value at the output of a rectifier or dc generator, multiplied by 100 to express it as a percentage.

perfect dielectric. A theoretical dielectric material without losses regardless of frequency or potential. A perfect vacuum is the only known perfect dielectric.

period. In alternating current, the time required for one cycle or one complete change to take place.

periodic. Recurring at equal intervals of time.

Permalloy. An alloy of nickel and iron used as core material for high-quality audio-frequency transformers.

permanent magnet. A piece of hardened steel or other magnetic material that has been artificially magnetized and retains its magnetism.

permanent magnet dynamic loudspeaker. A moving coil loudspeaker with its field supplied by a permanent magnet.

permatron. A thermionic vacuum tube in which the plate current is controlled by a magnetic field instead of a grid.

permeability. A measure of how much better a particular material is than air as a path for magnetic lines of force. The permeability of air is assumed as 1.

permeability tuning. A method of varying the inductance of an iron-core rf coil by moving a powdered-iron core in or out of the coil.

permeance. The reciprocal of reluctance, magnetic conductivity.

persistence. The measure of the length of time the screen of a cathode-ray tube remains luminescent after the excitation is removed.

persistence of vision. The ability of the eye to retain the impression of an image for a length of time after the image has disappeared from view. The property of the eye that enables it to fill in the intervals between successive images and to produce the illusion of motion.

phanotron. A hot-cathode diode gaseous tube.

phantom circuit. A circuit superimposed on two other circuits. Used in telephone and broadcast work to make two pairs of wires provide three complete circuits.

phase. An expression of how much of the time period of one cycle of a regularly recurring quantity has been completed, usually measured from a reference time when the quantity passes through zero from negative to positive. The *phase difference* of two or more quantities can be determined by comparing their phases at the instant one quantity is at the reference time. Phase is usually expressed as a *phase angle* measured in degrees or radians.

phase angle. A means of expressing the phase of a regularly recurring quantity in degrees or radians. Phase multiplied by 2π gives the phase angle in radians, and by 360 , the phase angle in degrees. If a cycle has advanced from zero to maximum, $\frac{1}{4}$ of the cycle has passed, or the phase is $\frac{1}{4}$ and the angle is $\frac{1}{4} \times 360 = 90^\circ$, or $\frac{1}{4} \times 2\pi = \frac{\pi}{2}$ radians. When two or more quantities are being compared, either their *phase difference* can be converted into a phase angle, or the difference between their phase angles can be found, to express the angle of lead or angle of lag between them.

phase deviation. In phase modulation, the amount by which the instantaneous carrier phase during modulation differs from the unmodulated phase.

phase difference. The amount by which the phase of one quantity leads or lags the phase of another. It is usually expressed as a *phase angle* in degrees or radians.

phase distortion. A condition in which unequal frequency response causes time delays that shift the phase of components of a signal. Particularly important in video amplifiers because it changes the peak values of the video signal and thus alters the contrast and resolution.

phase modulation. A system of radio broadcasting in which the amount of deviation in phase of

the carrier signal varies in accordance with the amplitude of the modulating signal, at a rate corresponding to the frequency of the modulating signal.

phaser. In facsimile, a device for adjusting the equipment so that the recorded elemental area bears the same relation to the record sheet as the corresponding transmitted elemental area bears to the subject copy in the direction of the scanning line.

phase reversal. A change in phase of one-half cycle or 180 degrees.

phase-shift oscillator. An oscillator made by connecting between the output and the input any network having a phase shift of an odd multiple of 180° (per stage) at the frequency of oscillation.

phase-splitting circuit. A circuit that produces from the same input waveform, two output waveforms that differ in phase from each other.

phase velocity. Product of frequency and wavelength.

Phasitron. A tube producing frequency modulation. The cathode emits a rotating sheet of electrons, the outer edge of which is sinusoidally modulated. The amount of energy reaching the second anode through holes in the first anode is determined by the speed of the rotating sheet of electrons, which is modulated by the intelligence signal.

phasmajector. See *monoscope*.

phenolic material. An insulating plastic such as Bakelite.

phenomenon. Any observable action, change, or occurrence.

Phillips screw. A screw having an indented cross in its head in place of the conventional slot.

phon. A term sometimes used in place of decibel to specify equivalent loudness levels.

phone. A headphone.

phono adapter. A device connected to an amplifier to provide terminals to which a phonograph pickup can be connected.

phonograph. See *record player*. Also a machine using a spring motor, reproducing recordings by mechanical means.

phonograph amplifier. An audio-frequency amplifier for use with a phonograph pickup.

phonograph connection. Two terminals or a jack sometimes provided on a receiver for making connections to a phonograph pickup, permitting use of the audio amplifier and loudspeaker to reproduce phonograph records.

phonograph oscillator. An rf oscillator arranged for modulation by the output of a phonograph pickup, so that the resulting modulated rf signal can be radiated to the antenna and ground terminals of a radio receiver. This permits the playing of records without having to make any direct connection to the receiver.

phonograph pickup. A device that converts variations in the grooves of a phonograph record into corresponding audio signals. It consists essentially of a needle that converts record-groove variations into mechanical movements, and a crystal, dynamic, or photoelectric cartidge that converts these mechanical movements into audio signals, mounted in a tone arm.

phosphor. A chemical that has the characteristic of emitting cold light, either from internal chemical action or from external excitation. Specifically, a chemical coating on the face

of a cathode-ray tube that becomes luminous when bombarded by electrons.

phosphor bronze. A hard, springy alloy of copper, tin, and phosphorous, widely used in radio for contact springs.

phosphorescence. Light emitted without tangible heat. Specifically, light given off by a phosphor after the exciting light of the electron stream has ceased to act. *Persistence, afterglow.*

photocathode. A cathode that emits electrons under the influence of light.

photocell. A device for converting variations of light intensity or color into equivalent electrical variations.

photoconductive cell. A light-sensitive cell whose ohmic resistance varies with changes in light falling on the cell.

photoelectric. Electrically sensitive to changes in light.

photoelectric cell. A light-sensitive cell, which can be any one of three basic types—*photoemissive, photoconductive, or photovoltaic.* It converts variations in light into corresponding variations in voltage or current.

photoelectric emission. Emission of electrons from a body under the influence of light.

photoemissive. Emitting electrons when struck by light.

photoemissive cell. A light-sensitive cell in which a treated cathode, mounted in a glass envelope, emits electrons under the action of light, these electrons being collected by the anode.

photographic recording. Facsimile recording by exposure of a photosensitive surface to a signal-controlled light beam or spot.

photo-ionization. Ionization occurring in a gas as a result of visible light or ultraviolet radiation.

photo-island grid. A thin sheet of metal having many very fine perforations, used as the photosensitive surface in the storage-type Farnsworth television dissector tube.

photometer. An instrument for measuring the brightness of sources of light.

photometry. A branch of the science of optics dealing with the measurement of illumination.

photophone. An instrument for transmitting sound over short distances by means of a beam of light.

photosensitive. Responsive to changes in light intensity.

photography. See *wire photo.*

phototube. A vacuum tube in which the cathode is radiated with visible or invisible light for electron-emitting purposes.

photovoltaic cell. A light-sensitive cell that generates a voltage when illuminated, this voltage varying with the amount of light falling on the cell. Also called a self-generating cell.

pickup. See *phonograph pickup.* Also, any device that converts original intelligence into an equivalent electrical signal, such as a television camera or a microphone. Also, the value of voltage or current at which a relay will operate.

pictorial wiring diagram. A diagram containing sketches of radio parts and showing the wiring between the parts.

picture black. The signal produced at any point in a facsimile system by the scanning of a selected area of subject copy having maximum density.

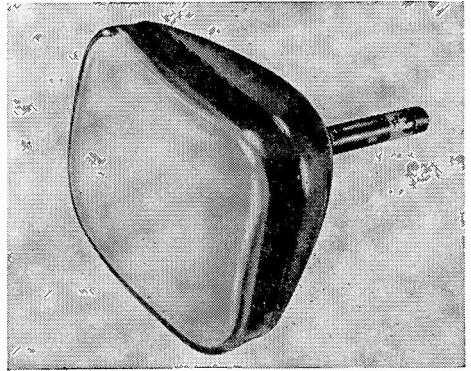
picture control. See *contrast control.*

picture element. In a television system, the smallest portion of a picture or scene that is individually converted into an electrical signal.

picture frequency. See *frame frequency.*

picture jump. Unsteadiness in the vertical direction of a television picture or of a picture projected by a motion-picture machine.

picture signal. The electrical pulses resulting from scanning of successive elements of a visual scene by a scanning device. The video signal.



Picture Tube

Courtesy Sylvania

picture tube. The image-reproducing cathode-ray tube in a television receiver.

picture white. The signal produced at any point in a facsimile system by the scanning of a selected area of subject copy having minimum density.

pie. One layer or section of a multisection winding. Sometimes written pi.

Pierce oscillator. A form of crystal oscillator circuit in which the frequency-controlling crystal element is connected between grid and plate of the oscillator tube. It needs no tuned plate circuit, and may therefore drive a final amplifier or buffer stage with but one tuning control. Used primarily by amateur radio operators.

pie winding. A method of constructing coils from a number of individual washer-shaped coils called pies. Also called pi winding.

piezoelectric. Possessing the ability to produce a voltage when mechanical force is applied, or to produce a force when a voltage is applied, especially of a crystal.

pigtail. A flexible connection between a stationary terminal and a part or terminal that has limited motion. Also, the connecting leads on parts such as resistors and condensers.

pilot jewel. A clear or colored glass or plastic placed over or in front of a pilot lamp.

pilot lamp. A small lamp mounted on the panel of a radio receiver to illuminate the tuning dial, or mounted on the panel of other radio apparatus to indicate when the apparatus is turned on.

pi mode. The mode of resonance of a multicavity

magnetron for which the phase difference between adjacent anode segments is π radians.

pin connections. Connections made to the pins of a vacuum tube. The following abbreviations are used to identify pin connections: NC, no connection; IS, internal shield; IC, internal connection (but no electrode connection); P, plate; G, grid; SG, screen grid; K, cathode; H, heater; F, filament; RC, ray-control electrode; TA, target.

pine-tree array. Dipole antennas aligned in a vertical plane known as the radiating curtain with a second array containing corresponding half-wave antennas parallel to and a quarter wavelength behind, forming a reflecting curtain.

pi network. A network of three impedances, two across the line and the third inserted in one line between the two so as to resemble the Greek letter π .

pin jack. A small receptacle into which is pushed a pin-like plug to complete a circuit connected to the two parts.

pip. A pulse or peak on a wave pattern.

piped program. A program that has been transmitted over wires.

pipe line. A shielded transmission line consisting of a wire inside a pipe. Also called coaxial line, coaxial cable, concentric line.

piston action. The movement in or out as a unit of the cone or diaphragm of a loudspeaker when driven at bass audio frequencies.

pitch. The frequency of a tone.

plane. A flat surface.

plane of polarization. In a radio wave, a plane perpendicular to the wave front and parallel to the electric component of the wave. In a vertically polarized wave, this plane is perpendicular to the earth. In a horizontally polarized wave, this plane is parallel to the earth.

plane-polarized wave. A wave in which the direction of the displacement at all points in a certain space is parallel to a fixed plane.

plano-concave. Having one flat and one inwardly curved surface.

plano-convex. Having one flat and one outwardly curved surface.

plan-position indicator (PPI). A radar system in which a plan or map of an area is shown on a cathode-ray tube.

plate. The principal anode in a tube, usually at a high positive potential with respect to the cathode to attract the electrons emitted by the cathode.

plate circuit. A circuit including the plate voltage source and all other parts connected between the cathode and plate terminals of a tube.

plate current. The current flowing through the plate circuit of a tube and between the plate and cathode inside the tube.

plate detection. Rectification of the radio-frequency signals in the plate circuit of a vacuum tube.

plate dissipation. The power in watts expended as heat in the plates or anodes of tubes. It is the difference between the plate input power and the power delivered to the load.

plate efficiency. The ratio of power delivered to the load (ac) to the plate input power (dc).

plate impedance. See *ac plate resistance*.

plate input power. The product of the dc voltage applied to the plates of the tubes in the final radio stage and the total current flowing to these plates, measured without modulation.

plate keying. Keying a telegraph transmitter stage by interrupting the plate supply of a transmitter.

plate-load impedance. The total impedance connected between anode and cathode.

plate modulation. Modulation produced by introduction of the modulating wave into the plate circuit of any tube in which the carrier-frequency wave is present.

plate neutralization. A method of neutralizing an amplifier in which a portion of the plate-cathode ac voltage is shifted 180° and applied to the grid-cathode circuit through a neutralizing capacitor.

plate resistance. The resistance in ohms of the plate-cathode path in a tube. See *dc plate resistance* and *ac plate resistance*.

plate saturation. The condition in which further increase of the plate voltage will not result in an increase of the plate current because all of the electrons being emitted by the cathode are being collected by the plate. Also known as voltage saturation.

plate supply. The voltage source used in a tube circuit to place the plate at a high positive potential with respect to the cathode.

plate-to-plate impedance. The load impedance measured between the plates of a push-pull amplifier stage.

plate voltage. The dc voltage existing between the plate and cathode terminals of a tube.

pliotron. A high-vacuum thermionic tube having one or more grid electrodes to control the magnitude of the unidirectional current flow.

plug. A device inserted in a terminal jack or outlet, used for conveniently making or breaking connections.

plug-in coil. A coil having as its terminals a number of prongs arranged to fit into a socket mounted on the radio chassis.

plug-in resistor. A filament voltage-dropping resistor mounted in a metal or glass enclosure and provided with a plug-in base.

plumbing. Popular term for microwave waveguides and associated equipment.

plus sign. A sign (+) used in mathematics to indicate addition or a positive value. Used in radio to indicate the positive terminal of a voltage source or positive polarity.

PM dynamic loudspeaker. See *permanent magnet dynamic loudspeaker*.

pneumatic loudspeaker. A loudspeaker in which the output is created by controlled variation of an air stream. Also, a loudspeaker encased in a hornlike baffle into which air is pumped under pressure to raise its efficiency.

pointer. The part of a meter or tuning dial that moves over the scale; an indicator.

point-to-point communication. Radio communication between two definite fixed stations.

point-to-point resistance. A method of testing wherein the resistance between given points in a set is measured and checked against expected normal values.

poison. In television or electronics, a substance that reduces phosphorescence in a luminescent material. Also, a contaminant that reduces emission.

proton. The natural, elemental quantity of positive electricity. The mass of the proton is 1849 times that of the electron. A proton has the same quantity of positive electricity as an electron has of negative electricity, hence one proton balances one electron.

protractor. An instrument for measuring or constructing angles.

public address amplifier. An audio amplifier capable of supplying sufficient audio power to loudspeakers for adequate sound coverage of public gatherings.

public address system. A complete system for reproducing voice and speech with adequate volume for large public gatherings. It includes one or more microphones, a powerful audio amplifier with suitable power supply, and a sufficient number of loudspeakers to give coverage of the audience area.

pulling. Forcing the frequency of an oscillator to change toward another frequency by some form of coupling or loading.

pull-up current. The minimum current that will cause the armature of a relay to be pulled up against the relay core.

pulsating current. A current that changes in value but not in direction.

pulse. A momentary sharp change in a current or voltage.

pulse-amplitude modulation (PAM). Amplitude modulation of a pulse carrier.

pulse cross. When driving or synchronizing pulses are displaced from their usual positions and are fed to the picture tube, a cross appears on the raster showing graphically the relations between the pulses.

pulse-decay time. The time required for the instantaneous amplitude to go from 90% to 10% of the peak value.

pulsed oscillator. An oscillator that is made to operate during recurrent intervals by self-generated or externally applied pulses.

pulse duration. The elapsed time between the start and finish of a single pulse.

pulse-duration modulation (PDM). A form of pulse-time modulation in which the duration of the pulse is the characteristic varied.

pulse-frequency modulation (PFM). A system in which the number of pulses in a given time is varied according to the modulation.

pulse generator. A device that generates pulses. Specifically, one for generating pulses for synchronizing purposes in a television system.

pulse-interval modulation (PIM). A form of pulse-time modulation in which the pulse interval is the characteristic varied.

pulse-length modulation (PLM). See *pulse-duration modulation*.

pulse modulation. The modulation of a carrier consisting of a series of pulses, by changing either the amplitude, frequency, or a time characteristic of the pulses.

pulse modulator. A device that applies pulses to the element in which modulation takes place.

pulse operation. Method of operation in which the energy is delivered in pulses.

pulse-position modulation (PPM). A form of pulse-time modulation in which the position in time of a pulse is the characteristic varied.

pulser. Electronic equipment for the production

of high voltage pulses of extremely short duration occurring at definite recurrence rates.

pulse repeater. A device used for receiving pulses from one circuit and transmitting corresponding pulses into another circuit.

pulse repetition rate. The number of pulses occurring in a given unit of time.

pulse-rise time. The time required for the instantaneous amplitude to go from 10% to 90% of the peak value.

pulse separator. A television receiver circuit that separates the horizontal and vertical pulses.

pulse-time modulation (PTM). Modulation in which the time of occurrence of some characteristic of a pulse carrier is varied, such as the pulse duration, the pulse position, or the interval between pulses.

pulse width. See *pulse duration*.

pulse-width modulation (PWM). See *pulse-duration modulation*.

pure tone. A sound produced by sinusoidal sound waves of a single frequency.

push-back hookup wire. Tinned copper hookup wire covered with a loosely braided cotton insulation that can be pushed back from the end of a wire length to expose sufficient bare wire for a connection.

push-button switch. A device that opens or closes a circuit by means of pressure upon a button.

push-button tuner. A tuning unit that automatically tunes a receiver to a station when the button assigned to that station is pressed.

push-pull circuit. A two-tube circuit so arranged that both tubes operate simultaneously and their individual plate currents add in the common load to balance out all even harmonics that would otherwise cause distortion.

push-pull oscillator. A balanced oscillator with two similar tubes in phase opposition.

push-pull transformer. An iron-core transformer designed for use in a push-pull amplifier circuit.

push-push circuit. A two-tube circuit so arranged that the tubes operate alternately into a common load.

pyrometer. An instrument for measuring high temperatures.



Q. The merit (degree of perfection) of a coil or condenser, equal to its reactance divided by its resistance.

Q factor. See *Q*.

Q signal. One of the three-letter abbreviations starting with Q in the International List of Abbreviations, used to represent complete sentences in radiotelegraphy. When the question form of the sentence is intended, the code signal for an interrogation mark is sent after the abbreviation. Thus, QRM means "I am being interfered with," and QRM? means "Are you being interfered with?" Other common Q signals used in a similar manner are: QRN, Atmospheric interference. QRT, Stop sending, used to clear bands in emergency. QRX, Wait. QSY, Shift frequency.

QSL card. A card sent by a radio amateur to verify communication with another amateur.

quadrantal error. Error in direction finder readings caused by re-radiated energy from metal surfaces of an airplane that is 90° out of phase with the original signal.

quadratic equation. An equation containing the square of the unknown quantity and no higher power. Examples: $P = I^2R$; $9x^2 + 7x = 60$.

quadrature. Displaced 90° in phase angle.

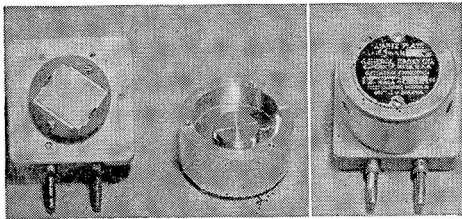
quantitative. Capable of measurement.

quarter-wave antenna. An antenna electrically equal to one-fourth the wavelength of the signal transmitted or received.

quarter-wave transformer. A section of transmission line one-quarter wavelength long, used as an impedance-matching transformer.

quarter-wave transmission line. A transmission line that is an electrical quarter-wavelength of the frequency for which it is designed.

quartz. A natural crystalline material widely used as the source of piezoelectric crystals.



Courtesy Bell Telephone Laboratories
Quartz Crystal

quartz crystal. A thin slab cut from a natural crystal of quartz and ground to a thickness that will make it vibrate at the desired frequency when supplied with energy. It is used as the master carrier frequency source in the crystal oscillator stage of a transmitter.

quartz oscillator. See *crystal oscillator*.

quasi-optical. Having properties similar to light waves in their propagation; said of microwaves.

quasi-single sideband. See *vestigial sideband*.

quenching frequency. A locally generated frequency produced in a super-regenerative detector stage at regular intervals to prevent oscillation during reception.

quenching signal. See *quenching frequency*.

quick-break fuse. A fuse that opens a circuit rapidly when it is overloaded, to prevent arcing.

quiescent carrier telephony. A radiotelephony system in which the carrier is suppressed whenever there are no voice signals to be transmitted.

quiescent operating point. The value of voltage or current characteristic of a vacuum tube circuit when no signal is being transmitted or received.

quiet automatic volume control. A noise limiter circuit that blocks an i-f or a-f stage until a certain signal strength is reached, and which does not therefore apply full amplification to background noise when tuning between stations.

quiet tuning. A means of silencing the output of a receiver at all times except when it is accurately tuned to an incoming carrier wave.

quieting sensitivity. The minimum signal input required to give a prescribed output signal-to-noise ratio.

quotient. The result obtained by division. Example: in $1400 \div 70 = 20$, the quotient is 20. (The dividend is 1400, and the divisor is 70.)

R

racon. Radar beacon used as a navigational aid.

radar. (Coined from the phrase, RADio Detection And Ranging.) A system for determining the presence and location of a distant object by transmitting high-power microwave pulses that are reflected back by the object. This reflected energy appears as a "pip" on the screen of a cathode-ray tube; the position of this pip on a calibrated axis indicates the distance of the target.

radar trace. The pattern produced on the cathode-ray screen of a radar unit.

radar transmitter. The transmitter of a radio detecting and ranging system.

radial lead. A lead coming from the side of a component, rather than axially from the end.

radian. An angle which, when placed with its vertex at the center of a circle, intercepts an arc equal in length to the radius of the circle. A complete circle contains 2π radians, hence 1 radian is 57.2958° , and 1° is 0.01745 radian.

radiant energy. Energy in the form of electromagnetic radiation such as radio waves, heat waves, or light waves.

radiate. To emit electromagnetic or heat waves into space.

radiating curtain. An antenna array of dipoles placed in a vertical plane to reinforce each other.

radiating guide. An ultra- to super-high-frequency waveguide designed to radiate energy into free space.

radiation. The process of emitting waves, as of radio waves from an antenna.

radiation efficiency. A transmitting antenna rating, equal to the ratio of the power radiated to the total power supplied to the antenna at a given frequency.

radiation field. Space containing electromagnetic lines of force.

radiation pattern. A diagram showing how well an antenna system radiates or picks up radio waves in all directions in one plane.

radiation resistance. That part of the total resistance of an antenna that causes energy to be radiated into space instead of being dissipated as heat loss at the antenna. It is equal to the radiated power (determined through field strength measurements) divided by the square of the antenna current at a point of maximum current.

radical sign. The sign $\sqrt{\quad}$, placed before a number to indicate that its square root is to be extracted. When some other root is to be extracted, the index number of that root is placed in the angle of the radical sign. Examples: $\sqrt{49}$ means square root of 49, which is 7; $\sqrt[3]{64}$ means cube root of 64, which is 4.

radicand. The number or quantity after a radical sign. Example: In \sqrt{x} , the radicand is x .

radio. The art of communication by means of radio waves traveling through free space, as

- In sound, television, facsimile, etc., as distinguished from *wired radio*, in which rf currents are transmitted over wire lines. Also, a receiving set capable of picking up radio waves and reproducing the intelligence they convey.
- radioactivity.** The emission of radiant energy by an element or material, either spontaneously or under the influence of an activating device.
- radio altimeter.** A device for determining the altitude of an airplane, consisting of a transmitter sending pulses which are reflected from the earth to a receiver. The time between the sending and receiving of a pulse indicates the altitude.
- Radio and Television Manufacturers Association (RTMA).** Formerly Radio Manufacturers Association (RMA). An organization of leading manufacturers of radio and television equipment, active in proposing standards of sizes and designs of parts and standardizing terms and definitions.
- radio beacon.** A radio transmitting station that is fixed in location and transmits a characteristic signal that can be used by mobile (ship or aircraft) stations to determine bearings, locations, or courses.
- radio bearing.** The angle between the direction of travel of a radio wave and due north.
- radio communication.** The radio transmission and reception of any form of intelligence, such as writing, signs, signals, pictures, and sounds of all kinds.
- radio compass.** A radio direction finder used chiefly in marine and aircraft radio stations for navigational purposes.
- radio control.** The control of moving objects such as airplanes, automobiles, ships, and torpedoes, by means of signals transmitted over radio waves from the transmitter location to special radio receiving equipment in the object being controlled. Also called remote control.
- radio direction finder.** A radio receiving device that can be used to determine the line of travel of radio waves.
- radio direction finding (rdf).** Determining direction by means of radio. Also British term for radar.
- radio fadeout.** Partial or complete blocking of radio waves by a sudden ionospheric disturbance.
- radio field intensity.** See *field intensity*.
- radio frequency.** A frequency at which it is possible to get useful electromagnetic radiation for communication purposes.
- radio-frequency amplifier.** A vacuum tube amplifier stage to provide amplification at radio frequencies.
- radio-frequency choke.** A choke coil designed to have high impedance at radio frequencies.
- radio-frequency transformer.** An air-core or powdered-iron core transformer used in rf circuits.
- radio landing beam.** A radio beam that serves for vertical guidance of aircraft when landing during unfavorable weather conditions.
- radio link.** The carrying of a program (sound or television) from point of pickup to main studio by means of radio instead of telephone lines.
- Radio Manufacturers Association (RMA).** See *Radio and Television Manufacturers Association*.
- radio marker beacon.** A radio beacon station used for marking the location of a point, a boundary, or a small area, such as for aircraft blind-landing systems.
- radio metal locator.** A radio instrument that indicates the presence of metal nearby by a change in meter reading or a change in a tone signal heard in headphones.
- radio meteorograph.** A combination meteorograph and radio transmitter carried aloft by an unmanned balloon and so designed that it will transmit back to earth ultra-high-frequency signals that can be interpreted by ground observers in terms of the pressure, temperature, and humidity at regular intervals during the ascent of the balloon into the stratosphere. When the balloon bursts, the instrument is lowered to earth by a parachute. Also called radiosonde.
- radio navigation.** Use of radio signals for course-plotting.
- radio photograph.** A photograph transmitted by radio.
- radio prospecting.** Use of radio equipment to locate mineral or oil deposits.
- radio proximity fuze.** A radio device contained in a missile to detonate it within predetermined limits of distance from a target by means of electromagnetic interaction with the target.
- radio range station.** A radio beacon station that transmits waves in definite directions, in such a way that departures from a given course can be observed by aircraft or ships.
- radio receiver.** An instrument that amplifies radio-frequency signals, separates the rf carrier from the intelligence signal, amplifies the intelligence signal additionally in most cases, then converts the intelligence signal into sound waves.
- radiosonde.** See *radio meteorograph*.
- radio spectrum.** All the wavelengths or frequencies that can be used for the transmission of energy, communications, or signals by radio. These frequencies are classified into bands with designations and abbreviations as given in the table on the next page.
- radio station.** A station equipped to engage in radio communications or radio transmission of energy. A station includes all apparatus used at a particular location for one class of service. Radio stations are classified according to the nature of the service they furnish.
- radio station interference.** Interference caused by radio waves from one or more undesired stations.
- radio telegraphy.** Radio communication by means of the International Morse Code.
- radiotelephone transmitter.** A transmitter capable of sending voice and music, as contrasted with a radiotelegraph transmitter, which can send only code.
- radio telephony.** The transmission of voice or music through space by means of modulated rf waves.
- radio transmitter.** A device for producing rf power for radio transmission.
- Radiotrician.** A graduate of the National Radio Institute, thoroughly trained as a radio serviceman or radio operator.
- radio wave.** A combination of electric and magnetic fields varying at a radio frequency, and capable of traveling through space.
- radio-wave propagation.** The transfer of energy by electromagnetic radiation.

radius. The distance from the center of a circle or arc to any point on that circle or arc.

radome. A streamlined antenna housing used on airplanes.

random winding. A winding made with no regard for the position of the turns or layers in reference to each other.

range. Extent of coverage or effectiveness, or measure of distance.

raster. The illuminated rectangular area scanned by the electron beam in a picture tube, visible when the brilliancy control is turned up with no signal.

rated output. The power, voltage, or current a device will provide when operated under specified conditions.

ratio. The value obtained by dividing one number by another.

ratio detector. An FM detector that uses a pair of diodes connected in such a manner that the audio output is proportional to the ratio of the FM voltages applied to the two diodes.

ray. The path along which electrons or light waves travel in space.

RC circuit. A time-determining network of resistors and capacitors in which the time constant is defined as the product of the resistance and the capacitance.

R-C coupling. Resistor-capacitor coupling between two circuits.

R-C oscillator. Any oscillator in which the frequency is determined by resistance-capacitance elements.

reactance. That part of the impedance offered to the flow of alternating current by the inductance or capacity of a part or circuit. Reactance is measured in ohms, and depends upon the frequency of the alternating current as well as upon the value of inductance or capacity.

reactance modulator. A stage used in frequency-modulation transmitters in which a vacuum tube acts as a reactance that varies in accordance with the intelligence modulation, causing the frequency of the oscillator stage to vary accordingly.

reactance tube. A tube that draws plate current out of phase with the plate voltage because of the circuit arrangement, and therefore resembles a reactance.

reactive. Pertaining to inductive or capacitive reactance.

reactor. A device that introduces reactance, either inductive or capacitive, into a circuit. A coil or condenser.

receiver. A device for receiving radio waves.

receiving antenna. A conductor or system of conductors used for the reception of radio signals.

receptacle. A socket or outlet into which a plug can be pushed or screwed for the purpose of making an electrical connection.

reciprocal. The reciprocal of a number is 1 divided by that number. Example: $\frac{1}{R}$ is the reciprocal of R.

recorder. An instrument that makes a record of a signal.

recording. A phonograph record. Also, the process of making records or of registering the received signal upon the record sheet of a facsimile receiver or measuring instrument.

recording disc. An unrecorded or blank disc used for sound recording purposes. Also called a recording blank.

recording head. The device that cuts a groove on a disc, or magnetizes a steel wire or magnetic tape in accordance with the sound being recorded.

recording level. The db or vu output of an audio amplifier used for recording.

record player. A motor-driven turntable and an electric pickup used for converting the variations on a phonograph record into electrical signals.

rectangular coordinates. The two values that specify the position of a point on a graph with respect to two reference lines at right angles to each other.

rectification. The process of changing alternating current into a current that flows in only one direction, usually a pulsating direct current.

rectifier. A device that changes an alternating current into a pulsating direct current.

rectilinear scanning. The process of scanning an area in a predetermined sequence of narrow straight parallel strips.

re-entrant cavity. A resonant cavity with one or more sections directed inwards, so the electric field is confined to a small area or volume.

reference level. The starting or zero point from which a scale is laid out or from which measurements are made.

FREQUENCY CLASSIFICATION IN THE RADIO SPECTRUM

	<i>Frequencies</i>		<i>Designations</i>	<i>Abbreviations</i>
	10 ke to	30 ke inclusive	Very Low	VLF
Above	30 ke to	300 ke	Low	LF
"	300 ke to	3 mc	Medium	MF
"	3 mc to	30 mc	High	HF
"	30 mc to	300 mc	Very High	VHF
"	300 mc to	3000 mc	Ultra High	UHF
"	3000 mc to	30,000 mc	Super High	SHF

reference recording. Recording of a radio program or other material, made for the purpose of checking.

reflected impedance. The effective impedance that appears across the primary of a transformer when a load is connected to the secondary.

reflected resistance. The effective resistance that appears across the primary of a transformer when a load is connected across the secondary.

reflected wave. The wave caused by the reflection of part of an incident or oncoming wave.

reflecting curtain. A vertical array of half-wave reflecting antenna elements, generally used behind a radiating curtain of a number of dipoles, to form a high-gain antenna array.

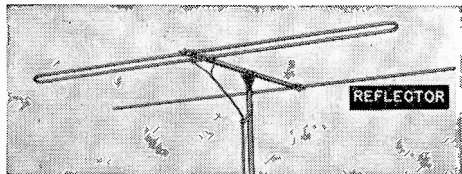
reflection. A change in the direction of waves after impinging on a surface.

reflection altimeter. An aircraft altimeter depending on the reflection of radio waves from the earth for the determination of altitude. See *radio altimeter*.

reflection, law of. The angle of reflection is equal to the angle of incidence, both measured from the normal to the surface.

reflection loss. The power lost in a transformer or transmission line because of a difference in the impedances of the source and load.

reflector. In a directional antenna system, a parasitic element in back of the antenna, that increases radiation or reception along a line pointing away from it toward the antenna. Also, an electrode, sometimes called a repeller, whose primary function is to reverse the direction of an electron stream.



Courtesy The American Phenolic Corp.

Antenna with Reflector

reflector voltage. The voltage between the reflector electrode and the cathode in a reflex klystron.

reflex circuit. A circuit through which a radio signal passes both before and after a change in its frequency.

reflex klystron. A klystron tube in which one set of grids is made to act both as the buncher and the catcher through the use of a *reflector* or repeller plate.

refracted wave. The wave caused by the refraction (change in direction) of the part of an incident or oncoming wave that travels into a different medium.

refraction. The bending of a light, heat, sound, or radio wave passing obliquely from one medium into another, in which the velocity of propagation is different from that in the first medium.

regeneration. A method of securing increased output from an amplifier by feeding a part of the amplifier output back to the amplifier in such a way that the signal is in phase with the input. Also called positive feedback.

regenerative detector. A vacuum tube detector in which intentional feedback of rf energy from the plate circuit to the control grid circuit

produces regeneration, greatly increasing the useful amplification.

regenerative receiver. A radio receiver that uses controlled regeneration to increase the amplification provided by a vacuum tube stage.

registry. The superposition of one image on another, as in the formation of an interlaced scanning raster.

regulated power supply. A power supply designed to have a constant voltage or current output under conditions of varying load or input power.

regulation. Ability to maintain constant output despite variations in load.

regulator. A device that accomplishes regulation within desired limits.

Reinartz crystal oscillator. A crystal-controlled vacuum-tube oscillator featuring a resonant circuit connected between cathode and ground, tuned to half the crystal frequency.

reinsertor. A circuit for establishing the dc level of a wave form. See *clamping*.

reinsertion of carrier. The combining of an incoming suppressed-carrier signal with a locally generated carrier signal in the receiver.

relaxation oscillator. An oscillator circuit in which alternate charging and discharging of a condenser through a resistance determines the number of pulses, so the frequency is determined by the time constant of the condenser and resistor.

relay. An electromagnetic switch that permits control of current in one circuit by a much smaller current flowing in another circuit.

relay transmitter. A transmitter that rebroadcasts television or sound programs to increase the service area. Often called repeater station.

reluctance. Opposition offered to magnetic flux.

reluctivity. The reciprocal of permeability.

remanence. The magnetic flux density remaining in a magnetic circuit after the removal of an applied magnetomotive force.

remote control. Control of any device from a distance.

remote cut-off tube. A variable- μ tube in which the spacing of the control grid wires is wider at the center than at the ends. The amplification of the tube does not vary in direct proportion to the bias, and some plate current flows even at high values of negative bias on the grid.

remote pickup. Any program not originating in the studio.

repeater. An amplifying station used to boost the volume on long telephone lines.

repeat point. A second position of a superheterodyne tuning dial at which reception of a given station recurs.

reproducer. A device for converting an electrical signal into some form capable of being perceived by the senses. Specifically, a loudspeaker, picture tube, or facsimile reproducer.

reproduction speed. The area of copy recorded per unit time in a facsimile system.

re-radiation. Return of energy to space by a device such as a receiving antenna that has extracted energy from space.

re-recording. A recording made from the playback of a recording.

- residual charge.** The charge remaining on the plates of a capacitor after discharge.
- residual gases.** The small amount of gas remaining in a tube after evacuation.
- residual magnetic induction.** *Residual magnetism.*
- residual magnetism.** Magnetism that remains in the core of an electromagnet after the electrical circuit has been broken.
- resistance.** The opposition a device or material offers to the flow of current, as a result of which electric energy is converted into heat or radiant energy. Resistance is the only opposition to dc in an ac circuit, the total opposition is known as the impedance; where there is negligible reactance, the impedance equals the resistance, but where there is appreciable reactance, the impedance is a combination of the two. Because of skin effect, losses in iron cores, etc., the resistance in a circuit may be somewhat higher for ac than for dc, and is called ac resistance to distinguish it from the lower dc resistance of that same circuit.
- resistance box.** See *decade box.*
- resistance bridge.** See *Wheatstone bridge.*
- resistance-capacitance coupling.** The coupling together of two vacuum tube stages or circuits by means of resistors and condensers.
- resistance coupling.** Another name for resistance-capacitance coupling.
- resistance drop.** The voltage drop occurring across a resistance when a current flows through it. An IR drop.
- resistance loss.** See I^2R loss.
- resistance pad.** A system of resistors used to reduce signal strength, change impedance, or isolate one circuit from another.
- resistance wire.** Wire made from an alloy having high resistivity.
- resistivity.** The resistance of a unit cube of a material.
- resistor.** A radio part that offers resistance to the flow of electric current.
- resistor core.** The support on which a resistor element is wound.
- resistor element.** The part of a resistor that possesses the resistance property.
- resolution.** Degree of reproduction of the detail of a televised scene. The definition.
- resolution chart.** A television test pattern containing a number of converging lines. The point on the screen where these lines seem to merge into one, determines the maximum resolution of the image.
- resolution pattern.** See *resolution chart.*
- resolution wedge.** On a television test pattern, a group of gradually converging lines used to measure resolution.
- resonance.** In a circuit containing both inductance and capacity, a condition in which the inductive reactance is equal to and cancels out the capacitive reactance.
- resonance bridge.** See *impedance bridge.*
- resonance curve.** A frequency response curve that shows in graphical form the manner in which any apparatus containing a resonant circuit handles or amplifies the various frequencies at or near the resonant frequency.
- resonance indicator.** A device, such as a meter or neon lamp, that provides visual means of showing resonance in a circuit.
- resonant circuit.** A circuit containing inductance and capacity. Specifically, a circuit in which the inductance and capacity values have been chosen so the circuit will resonate at a desired operating frequency.
- resonant current step-up.** The increase of the current in a parallel resonant circuit at resonance, over the line current fed into it.
- resonant frequency.** The frequency at which the inductive and capacitive reactances are balanced.
- resonant line.** A transmission line whose length makes it resonant at the transmitted frequency, or one tuned to such a frequency by adding the proper inductance or capacity to it.
- resonant-line oscillator.** A self-excited ultra-high frequency oscillator using parallel rods to form the grid and plate inductances.
- resonant resistance.** The resistance offered by a parallel resonant circuit at resonance.
- resonant voltage step-up.** The increase in voltage across each element of a series resonant circuit at resonance, over the source voltage.
- resonate.** To bring to resonance, as by tuning.
- resonator.** A hollow chamber forming the tuned circuit of a microwave oscillator. See *cavity resonator.*
- response.** The amplification of a device at a particular frequency.
- response characteristic.** A curve showing the response of a radio device, circuit, or system over a range of frequencies.
- resting frequency.** The assigned carrier frequency of a radio station using the frequency modulation system of broadcasting. The resting frequency is radiated only during intervals when no sound waves are being transmitted.
- retarding-field oscillator.** An oscillator using a vacuum tube in which the electrons oscillate back and forth through a grid maintained positive with respect to the cathode and the plate. The field in the region of the grid exerts a retarding effect that draws electrons back after passing through it in either direction.
- retentivity.** The property of retaining magnetism after the magnetizing force has been removed.
- retentivity of vision.** See *persistence of vision.*
- retrace.** The path traveled by an electron beam from the end of one line or field to the start of the next line or field. Flyback.
- retrace lines.** Lines on a cathode-ray tube made during the retrace.
- retrace time.** The time required for the spot to return after each sweep. It is also referred to as return time or flyback time.
- return wire.** The ground or common lead.
- reverberation.** The continuation of sound by excessive reflection.
- reverberation time.** The time in seconds required for a sound of a given frequency to decrease, after the sound source is stopped, to one millionth of its initial value.
- rf power supply.** A high-voltage power supply sometimes used in television receivers, consisting of an rf oscillator whose output is fed through a step-up transformer to a rectifier.
- rheostat.** A variable resistor having a movable contact controlled by a knob, so that the

amount of resistance in use can be easily adjusted while the circuit is electrically alive.

rhombic antenna. A directional antenna consisting of four long wires arranged to form a rhombus (a parallelogram with all four sides equal, like a diamond).

Rhumbatron. See *cavity resonator*.

ribbon microphone. A moving-conductor microphone in which the moving conductor is a single corrugated metal ribbon mounted between the poles of permanent magnets. Often called a *velocity microphone*.

ride gain. To control the volume range of a program electrically in order to transmit it over lines and equipment at a level above the noise level but below the overload level.

Rieke diagram. A graph used to determine the frequency of operation and power output of a magnetron from the standing wave ratio and the phase of the reflected signal.

rig. A complete system of components. Thus, an amateur rig is the complete amateur station consisting of receiver, transmitter, and all of the accessories used with this equipment.

right angle. The angle formed by two straight lines which meet at an angle of 90°.

right-handed elliptically polarized wave. An elliptically polarized wave in which the rotation of the direction of displacement is clockwise for an observer looking in the direction the wave is traveling.

right-hand taper. A concentration of the resistance toward the counter-clockwise end of a potentiometer or a rheostat when held with the shaft pointing toward the observer.

right triangle. A triangle in which one of the angles is a right angle (90°).

rim-drive. A method of driving a phonograph or sound recorder turntable with a rubber-covered wheel in contact with the rim of the turntable.

ringing. An oscillation occurring as a result of a sudden change in input signal.

ring oscillator. An arrangement of two or more pairs of tubes operating as push-pull oscillators around a ring, usually with alternate successive pairs of grids and plates connected to tank circuits. Adjacent tubes around the ring operate in phase opposition.

ripple. An alternating-current component present in the output of a dc voltage supply.

ripple current. The alternating-current component of a pulsating unidirectional current.

ripple factor. The effective value of the alternating components of voltage or current divided by the direct or average values of the voltage or current.

ripple filter. A filter that passes only frequencies below a critical cut-off frequency, used to reduce the ripple current of a rectifier or dc generator while allowing direct current to pass freely.

ripple frequency. The frequency of the ripple current.

ripple voltage. The alternating component of the unidirectional voltage from a rectifier or generator used as a source of direct-current power.

rise time. See *pulse rise time*.

RMA color code. A standard method of designating part values and part leads by colored markings, developed by the Radio Manufacturers Association.

rms. Root mean square, the effective value of an alternating current. It corresponds to the direct current value that will produce the same heating effect.

Rochelle salt crystal. A crystal of sodium potassium tartrate, having a pronounced piezoelectric effect, used in crystal microphones and crystal phonograph pickups.

rocking. A term applied to the back and forth rotation of the main tuning gang as the oscillator padder in a superheterodyne receiver is adjusted at the low-frequency end of the dial.

Roentgen ray. The x-ray.

Roentgen, Wilhelm Konrad. German physicist (1845-1923), the discoverer of the X-ray.

root. A number which, when multiplied by itself a number of times, equals a given number. The radical sign $\sqrt{\quad}$ is used to indicate square root, and the radical sign with an index number in its angle is used to indicate any other root. Example: $\sqrt[3]{3125} = 5$, which means that the fifth root of 3125 is 5.

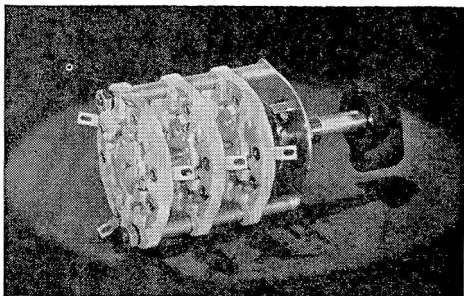
root mean square (rms). The square root of the average of squares of values uniformly distributed throughout a cycle.

rosin-core solder. Solder that has as its core the correct amount of rosin flux for effective radio soldering work. The rosin is released automatically as the solder is applied to the heated joint.

rotary beam antenna. A highly directional short-wave receiving or transmitting antenna system mounted in such a way that it can be rotated to any desired position either manually or by an electric motor drive.

rotary converter. A dynamo having a single armature equipped with both slip rings and a commutator, so that both ac and dc can be obtained from it simultaneously if used in conjunction with a motor or engine.

rotary spark gap. A type of spark gap using a rotating disc having studs from which sparks leap to one or more stationary electrodes when high voltage is connected between disc and stationary electrodes.



Rotary Switch

rotary switch. Any switch that is operated by rotating a control knob.

rotor. A rotating part, such as the rotating armature of an electric motor or generator.

rotor plates. The movable plates of a variable condenser.

Ruhmkorff coil. See *induction coil*.

rumble. Low-frequency vibration mechanically

transmitted to the recording or reproducing turntable and superimposed on the reproduction.

S

safety factor. The ratio of the normal operating rating, to the maximum safe rating.

sal ammoniac. Ammonium chloride. A chemical used in primary cells.

sampler. A switching arrangement used to connect circuits in rapid succession. In color television, the sampler of the transmitter switches in signals for each of three colors in a specified order. At the receiver, the sampler routes the three color signals in proper order to the reproducer.

sampling. The process of switching to get small segments of each cycle at a time.

sapphire. A gem used in the tips of high-grade phonograph needles and in cutting needles used with sound recorders.

saturation. In a magnetic circuit, the condition wherein increases in magnetomotive force produce negligible additional flux. Also see *plate saturation* and *temperature saturation*.

sawtooth. A voltage or current wave form that rises linearly to its peak and then drops rapidly back to its starting level.

sawtooth generator. A neon or thyratron relaxation oscillator or a vacuum-tube oscillator providing an alternating voltage characterized by a sawtooth wave form.

scalar quantity. A quantity that has only magnitude, and no direction.

scale. A series of marks printed on a surface over which an indicator moves, or which moves past an indicator.

scale division. A region between one line and the next adjacent line on a scale.

scaling circuit. A circuit that actuates a counting device on receiving a predetermined number of pulses.

scanner. The part of a facsimile transmitter that systematically translates the densities of the elemental areas of the subject copy into signal-wave form.

scanning. The process of successively converting the amount of light present in each of the picture elements that make up the total area of a picture or scene into electrical signals for television or facsimile transmission. Also, the reverse process at the receiver.

scanning disc. A rotating disc having a spiral row of holes or lenses near the edge, used in some mechanical television systems to break up a picture or scene into elemental areas, or to reconstruct televised scenes.

scanning line. A single continuous narrow strip, produced by the process of scanning in television or facsimile.

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

scanning spot. The area viewed at any instant by the scanner in a facsimile system. Also, the cross-sectional area of the electron beam at either the camera or picture tube in a TV system.

scanning yoke. The electromagnet coils that provide controlled deflection of the electron beam in a cathode-ray tube.

scattered reflections. Reflections from a region of the ionosphere, which interfere and cause rapid fading. They are variable in respect to time of occurrence, geographical distribution, intensity, and frequency range.

schematic diagram. A diagram that shows electrical connections of an electronic device by means of symbols used to represent the parts.

Schmidt system. An optical system used to produce large projection images. A large hemispherical mirror is used to project the image formed on a small picture tube onto a translucent screen. Optical distortion is compensated for by interposing a corrector lens in the projection path.

scrambled speech. Radio-telephone speech that has been made unintelligible to those not having the proper receiving equipment.

scratch filter. A filter circuit used in connection with a phonograph pickup to block those frequencies at the higher end of the audio range at which needle scratch is most prominent.

screen. The surface of a cathode-ray tube upon which the visible pattern is produced. Also a shield.

screen grid. An electrode mounted between the control grid and plate of a vacuum tube for the purpose of reducing the capacity between these two electrodes.

screen-grid modulation. Modulation produced by introduction of the modulating signal into the screen-grid circuit of a multi-grid tube in which the carrier is present.

screen-grid tube. A vacuum tube having a screen grid.

screen-grid voltage. The dc voltage applied between the screen grid and the cathode of a vacuum tube to make the screen grid positive with respect to the cathode.

screen persistence. The property of the fluorescent screen of a picture tube to continue the radiation of light for a short time after the electron beam causing the light spot has passed.

seal-disc tube. A tube in which the grid is a portion of a disc, sealed into the glass envelope. See *lighthouse tube*.

sealing compound. Wax or pitch used in condenser blocks and transformer housings to prevent air and moisture from reaching the parts.

sealing off. Final closure of the glass or metal envelope of a vacuum tube or lamp after evacuation.

search coil. A tiny exploring coil of wire used with a ballistic galvanometer or fluxmeter to measure flux density in a magnetic field.

secant (sec). A trigonometric function. The secant of an acute angle of a right triangle (written $\sec \theta$) is equal to the hypotenuse divided by the adjacent side. The secant is the reciprocal of the cosine.

second anode. The electrode in a cathode-ray tube that is maintained at a constant positive potential and used to accelerate the electron beam.

secondary. A transformer winding that receives energy by electromagnetic induction from another or primary winding.

secondary cell. A dc voltage source capable of storing electrical energy. When exhausted, it can be recharged by sending direct current through it in the reverse direction. Each cell of an ordinary storage battery is a secondary cell.

- secondary electrons.** Electrons emitted from a body due to the impact or bombardment of other electrons.
- secondary emission.** Emission of electrons from an electrode when it is hit or bombarded by high-speed electrons.
- secondary voltage.** The voltage across the secondary winding of a transformer.
- secondary winding.** See *secondary*.
- second detector.** The stage of a superheterodyne receiver that separates the modulation from the intermediate frequency carrier signal.
- sectoral horn.** An electromagnetic radiator, two opposite sides of which are parallel, and the remaining two sides of which diverge.
- selective fading.** Fading that is not the same at all frequencies.
- selective interference.** Radio interference concentrated in a narrow band of frequencies. Some examples are other radio stations on the same or adjacent frequencies, or harmonics of other radio stations.
- selective reflection.** Reflection of waves of only a certain group of frequencies.
- selectivity.** The degree to which a receiver is capable of reproducing signals of one station while rejecting signals from all other stations on adjacent channels.
- selectivity control.** The device or circuit that changes the selectivity of a receiver.
- selector.** A device, mechanical, electronic, or electrical, for making connections to any one of a number of circuits at will.
- selector switch.** See *selector*.
- selenium cell.** A photoconductive cell using some form of selenium as the light-sensitive material. The resistance of the cell varies with the amount of light falling on the cell.
- selenium rectifier.** A dry-disc rectifier made of a crystalline selenium layer between two electrodes. A chemical barrier action between the selenium and one electrode produces a unidirectional current flow when ac voltage is applied.
- self-bias.** See *automatic grid bias*.
- self-cleaning contacts.** Contacts designed to close with a rubbing motion that keeps them clean.
- self-excitation.** Supplying of field current to a generator from its own armature.
- self-excited oscillator.** An oscillator that starts itself. Any change in plate current will induce a voltage in a tank circuit, which changes the grid voltage so that oscillations are developed and maintained.
- self-healing capacitor.** A capacitor that repairs itself after dielectric breakdown.
- self-inductance.** The property that determines how much electromotive force will be induced in a coil or circuit by a change of current in that same coil or circuit; often simply called inductance.
- self-modulated oscillator.** See *blocking oscillator*.
- self-quenched detector.** A super-regenerative detector in which the time constant of the grid leak and grid capacitor is sufficient to cause intermittent oscillation above audio frequencies, stopping normal regeneration each time before it becomes squealing.
- Selsyn motor.** A synchronous motor that accurately follows the phase of the voltage fed to it.
- semi-conductors.** Materials characterized by comparatively high resistivities. Many of these are salts or oxides in which conduction is ionic. Another group, more important in communications, are semi-metallic elements or oxides in which conduction is electronic.
- sending.** Transmitting, as Morse code.
- sense antenna.** A non-directional antenna used with a direction finder to cause reception to be unidirectional rather than bidirectional.
- sense finder.** The portion of a radio direction finder that determines which of two opposite directions (180° apart) a radio wave is coming from.
- sensitive relay.** A relay requiring very small amounts of current for operation.
- sensitivity.** A measure of the ability of a receiver to reproduce weak signals with satisfactory volume. The smaller the input necessary to give a standard test output, the higher the sensitivity.
- sensitivity control.** A device that governs the gain of the rf or i-f amplifier stages of a receiver.
- sequential system.** A system of color television transmission in which the colors are transmitted one after the other and which depends on eye retention and picture tube storage to combine them.
- series.** An arrangement of parts in such a way that the same current flows through all of them.
- series connection.** A connection in which the same current must flow through all of the series-connected parts.
- series feed.** Application of a dc operating voltage through a circuit carrying a signal current.
- series modulation.** Modulation in which plate circuits of the modulating tube and the modulated amplifier tube are in series with the plate voltage supply.
- series peaking.** The use of an inductance in series with the plate of a video amplifier tube to compensate for loss of high-frequency gain and to correct high-frequency phase shift.
- series resonant circuit.** A circuit in which a coil and condenser are connected in series with the source of voltage, or in which the exciting voltage is induced in the coil, and where the inductive reactance of the coil is equal to the capacitive reactance of the condenser at the desired resonant frequency.
- serrated pulse.** In television, a vertical synchronizing pulse divided into a number of small pulses that act for only half a line.
- serrated rotor plate.** A variable condenser rotor plate having slots cut along its edge to divide the plate into sections that can be bent in or out to adjust the capacity during alignment.
- service area.** The region around a station in which its signal strength is strong enough to insure satisfactory reception at all times.
- service band.** A band of frequencies allocated to a given class of radio-communication service, such as the broadcast band, a police band, etc.
- serviceman.** A radio repairman or radio technician.
- service oscillator.** A test instrument used to generate radio-frequency oscillations for alignment and test purposes.

sesqui-sideband transmission. The transmission of a carrier with one full sideband and half of the other. See *vestigial sideband*.

set analyzer. A test instrument for measuring voltages and currents in electronic equipment.

set-up. The initial adjustment of a receiver or transmitter before it is placed in service.

shaded-pole induction motor. An induction motor utilizing field displacement caused by a small coil wound around a part of one field pole for initiating rotation.

shading ring. A large copper ring placed around the central pole piece of a loudspeaker field magnet to act as a shorted turn and buck out hum voltages. Also called shading coil, and used on part of one pole of small ac motors to produce a rotating magnetic field.

shading signal. A signal that raises the gain of the amplifier of a television camera for those intervals of time when the electron beam is in a dark-spot area.

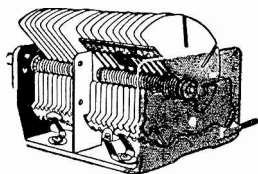
shadow tuning indicator. A tuning meter having a small square metal vane mounted on a shaft, which in turn is connected to a meter movement. A pilot lamp is mounted behind the vane so that a shadow is thrown upon a glass screen. The meter is so constructed and connected into a radio receiver circuit that the shadow will be narrowest when the receiver is accurately tuned to a station.

shank. The portion of a phonograph or recording needle that is clamped into position by a set-screw in the pickup or cutting head.

sharp. A term usually used to describe the selectivity of a circuit that will respond to a very limited range of frequencies or to a single frequency only.

sheath. The external conducting surface of a shielded transmission line. Also, the metal wall of a wave guide.

shell-type transformer. A transformer whose external metal covering resembles a shell or a dish, and whose core has three legs, with the coils wound on the center leg. Contrasted with the core type which has the form of an "O" with coils wound on both sides.



Serrated Rotor Plates

shield. A metal can or housing placed around a part, wire, or circuit to prevent its electric and magnetic fields from affecting nearby parts or to prevent other fields from affecting it.

shielded line. A transmission line having an external conducting surface (a sheath or shield) that confines the signals to the space within the shield or prevents pickup of undesired signals by the line.

shielded pair. A two-wire transmission line surrounded by a metal sheath.

shielded wire. Insulated wire having around it a shield of tinned, braided copper wire.

shielding. Metal covering used on a wire, or the

metal can, partition, or plates used around parts to prevent undesirable radiation, pickup of signals, magnetic induction, stray current, or ac hum.

shock excitation. Production of oscillations in an oscillatory circuit by a sudden electrical discharge or pulse.

shoran. (Coined from SHORT RANGE Navigation.) A system for determining distance from fixed known points by measuring the time taken for a pulse signal to travel from the airplane to a receiver-transmitter at the fixed point and return.

short circuit. An undesirable current path, occurring accidentally or because of a part breakdown, that exists between the two sides of a circuit or between any two circuit terminals.

shorting contact switch. A rotary selector switch in which the width of the movable contact is greater than the distance between contact studs, so the circuit is never completely open. Also called a make-before-break switch.

short-wave converter. A radio device that can be connected between a broadcast receiver and its antenna system to convert high-frequency signals to a broadcast-band frequency that can be handled by the receiver.

short waves. Wavelengths shorter than those included in the broadcast band, hence waves shorter than 200 meters. Short waves correspond to frequencies higher than the highest broadcast-band frequency of 1600 kilocycles.

short-wave transmitter. A radio transmitter that radiates short waves.

shot effect. The uneven or non-uniform impact of electrons on the plate of a vacuum tube, which shows up as noise in a sensitive amplifier.

shunt. A resistor placed across the terminals of an ammeter to allow a definite part of the circuit current to go around the meter. Also, any parallel-connected part, or the act of placing one part in parallel with another.

shunt feed. The application of a dc operating voltage through a circuit parallel to and separated from the signal circuit. Parallel feed.

shunt peaking. The use of an inductance in a parallel circuit branch of a video amplifier to compensate for the high-frequency loss due to the shunt circuit capacitance or to correct the high-frequency phase shift.

shunt-wound. A motor or generator wound so the armature and field are in parallel.

shutter. A device for cutting off light.

sideband. A band of frequencies on either side of the carrier frequency of a modulated radio wave.

sideband attenuation. Attenuation in which the transmitted amplitude of some component or components of a modulated signal (excluding the carrier) is smaller than that produced by the modulation process.

side frequency. A frequency on either side of the carrier frequency, a component of a sideband.

sign. A symbol used to indicate a particular operation in arithmetic, algebra, or mathematics in general. Examples: +, ×, ÷, =. Also characters indicating polarity and positive and negative numbers.

signal. A radio wave or alternating current that carries intelligence of any form.

signal generator. A test instrument used to produce a modulated or unmodulated rf carrier

- signal having a known radio-frequency value, sometimes also at a known voltage.
- signal-noise ratio.** See *signal-to-noise ratio*.
- signal plate.** The metal plate on the back of the mica sheet supporting the mosaic of one type of cathode-ray television camera tube. A capacity exists between each globule and this plate, and as each globule loses electrons, the effect is relayed electrically to the signal plate through the mica dielectric.
- signal-shifter.** A variable-frequency rf exciter or oscillator intended chiefly for amateur transmitters.
- signal strength.** A measure of the signal level at a particular location, usually expressed as millivolts per meter of effective height of the receiving antenna.
- signal-strength meter.** A meter connected in the avc circuit of a receiver and calibrated in db or arbitrary units to indicate the strength of a received signal.
- signal-to-noise ratio.** The ratio of the intensity of a desired signal at any point to the intensity of noise signals at that same point.
- signal tracer.** A test instrument designed to indicate the presence of signals at any point in a receiver.
- signal tracing.** A receiver servicing technique that involves tracing the progress of a signal through an entire receiver, stage by stage, while the receiver is in operation. Measurements made during this procedure by a signal tracer indicate when the defective part or stage has been reached.
- signal wave.** A wave that conveys a signal.
- silent period.** A period during each hour in which ship and shore radio stations must remain silent and listen for distress calls.
- silk-covered wire.** Wire insulated with one or more layers of silk.
- simplex operation.** Operation of a telegraph or radio system in only one direction at a time.
- simultaneous transmission.** A system of color television transmission in which all three primary colors are transmitted at the same instant over separate channels, and are superimposed one over the other at the receiver.
- sine (sin).** A trigonometric function. The sine of an acute angle of a right triangle (written $\sin \theta$) is equal to the opposite side divided by the hypotenuse.
- sine wave.** The wave form of a single-frequency alternating current. A wave whose displacement is the sine of an angle proportional to time, or distance, or both.
- singing.** An undesired self-sustained oscillation.
- singing point.** The adjustment of gain or phase or both, at which singing will start.
- single-button carbon microphone.** A microphone having a carbon-filled button on only one side of its diaphragm.
- single-dial control.** Tuning in a station by means of a single control that is mechanically linked to all tuning condensers or tuning inductances in the set.
- single ended.** Using a single tube or tubes connected in parallel rather than in push-pull.
- single-ended stage.** An amplifier in which only one tube is normally used, or, if more than one tube is used, they are connected in parallel so that operation is not balanced with respect to ground.
- single-ended tube.** A tube with all grid connections on the base (no top cap).
- single phase.** A circuit or device that is energized by a single alternating voltage. Also, one of the phases of a polyphase system.
- single-pole switch.** A toggle or knife switch having only one movable contact arm or blade.
- single-sideband transmission.** A method of broadcasting in which one sideband is transmitted but the other sideband is suppressed. The carrier wave may be either transmitted or suppressed.
- single-signal receiver.** A superheterodyne receiver equipped with a crystal filter usually located in the intermediate-frequency amplifier to provide single-frequency (code) reception. Also a set designed to receive only one station.
- single-throw switch.** A toggle or knife switch of the ON-OFF type, capable of closing or opening only one circuit for each blade of the switch.
- sink.** Term sometimes used by telephone engineers to designate a load or power-consuming device.
- sinusoidal.** Having a sine-wave form.
- skew.** Distortion produced by a facsimile recorder due to lack of synchronism between scanner and recorder.
- skin effect.** The tendency of a high-frequency current to flow near the surface of the conductor, rather than through the entire cross-section of the conductor. This decreases the useful diameter of the conductor, so it acts as if it has more resistance than it does to dc.
- skip distance.** Distance between the transmitting antenna and the nearest point at which the reflected sky wave comes back to earth.
- skip zone.** A ring-shaped region around a transmitter within which there is no reception from the transmitter except that from ground waves. The outer edge of the ring is fixed by the skip distance.
- sky waves.** Radio waves that travel up into the sky from the transmitting antenna, some of which are reflected back to earth by the Kennelly-Heaviside ionized layer.
- sleeve.** The cylindrical metal contacting part immediately back of the tip in a telephone or radio-type plug. Also, the insulating jacket that fits over the cone of metal-cone television kinescopes. Also, insulating tubing or spaghetti, used as a sheath over wire.
- slide.** A title or picture mounted for transparency projection.
- slider.** A sliding type of movable contact.
- slide rule.** A device consisting of sliding ruler-like scales and a movable indicator, arranged to give a convenient mechanical equivalent of a table of logarithms. It is used for performing the operations of multiplication, division, squaring, cubing, extracting square roots, and determining trigonometric functions.
- slide-rule dial.** A tuning dial used on receivers, in which a vertical marker moves horizontally over long straight scales resembling the scales of a slide rule.
- slip.** The difference between synchronous and actual speed in an induction motor.
- slip rings.** The rings of an ac motor or generator, corresponding to the commutator of a dc motor or generator, through which connection is made to the rotating member of the device.

slot antenna. A radiating element formed by a slot in a metal surface.

slow-acting relay. A time delay relay in which an adjustable interval of time exists between energizing or de-energizing of the coil and attraction or releasing of the armature.

slow-release relay. A relay in which there is an appreciable delay between de-energizing of the coil and release of the armature.

slug. A brass rod or powdered-iron core used in an rf coil. Also, a heavy metal ring or short-circuited winding placed on the core of a relay to give a time delay in its operation.

slug tuning. Varying the frequency of a resonant circuit by introducing a slug of material into either the electric or magnetic fields or both.

smear ghost. A spurious image caused by a number of multiple reflections.

S meter. See *signal strength meter*.

smoothing choke. An iron-core inductor used in a filter to remove pulsations in the unidirectional output current of a rectifier or direct-current generator.

smoothing filter. A filter composed of inductance and capacitance for removing ac components from the unidirectional output current of a rectifier or direct-current generator.

snap switch. A switch in which the contacts are separated or brought together suddenly by the action of a spring placed under tension or compression by the operating knob or lever.

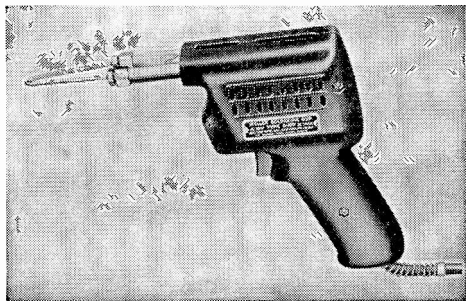
snow. Television slang for the effect of random noise on the reproduced picture. It has the appearance of a grainy, speckled pattern superimposed on the picture.

socket. A mounting device for tubes, plug-in coils, plug-in condensers, plug-in resistors, and crystals, having holes with spring clips arranged to fit and grip the terminal prongs of the part being plugged in. Also, a bayonet or screw-type socket for pilot lamps.

soft tube. A vacuum tube in which a small amount of gas is allowed to remain when the bulb is evacuated.

solder. An alloy of lead and tin that melts at a fairly low temperature and is used for making permanent electrical connections between parts and wires.

soldering gun. A soldering iron resembling a pistol. It has a fast-heating resistance element at the tip, that operates at high current and low voltage from a step-down transformer built into the unit.



Courtesy Weller Mfg. Co.

Soldering Gun

soldering iron. A device used to apply heat to a joint to be made permanent by soldering.

soldering pencil. A soldering iron with a thin barrel and tip for soldering in small spaces.

solderless connections. Wiring connections made by the use of small screw clamps that firmly hold the wires to be joined.

solenoid. An electromagnet having a movable iron core.

solid conductor. A single wire. A conductor that is not divided into strands.

sonar. (Coined from Sound Navigation And Ranging.) A system for determining the direction and position of an object by means of reflected sound waves.

sonic. Pertaining to or utilizing sound waves.

sound. A general term used to specify a sound wave (a traveling vibration in air or some other elastic medium) or a sound sensation (the effect of this sound wave on human ears). Sound is sometimes defined as a vibration of a body or material at a rate that can be heard by human ears. The extreme limits of human hearing are 20 cycles and 20,000 cycles, but animals can hear still higher frequencies. Bats can hear sound waves as high as 50,000 cycles. Sound can travel through any medium that can vibrate; the resulting traveling vibrations are called sound waves.

sound analyzer. An electronic apparatus, such as an oscilloscope, harmonic analyzer, or audiometer, used to measure sound levels and analyze frequency components in an audio signal.

sound carrier. The television signal carrier that conveys the audio part of the signal.

sound effects. Life-like sound imitations produced by various devices or recordings.

sounder. A telegraph receiving instrument.

sound gate. The mechanism through which sound motion picture film passes for the purpose of converting the sound track on the film into audio signals.

sound intensity. The sound energy transmitted per unit of time in a specified direction through a unit area perpendicular to this direction. It is expressed in ergs per second per square centimeter or in watts per square centimeter. Also called flux density or sound-energy flux density.

sound-level meter. An instrument for measuring sound intensities electrically, having an output indicator calibrated in db or directly in units of sound intensity.

sound panel. Movable panels of rock wool for sound absorption, or hard surfaces for reflection.

sound-powered telephone. A telephone operating entirely on current generated by the speaker's voice, requiring no batteries or power supply. A diaphragm, activated by sound waves, moves a small coil through a magnetic field, producing a current in the coil.

sound pressure. The effective (rms) value of the sound pressure, measured in dynes per square centimeter.

sound sensation. The sensation produced in the human ear by a sound wave.

sound track. A recording of sound on film or on sensitized paper for reproduction.

sound wave. A traveling wave produced by vibration of an elastic medium (air, metal, wood, etc.) at a rate that can be heard.

source. The part supplying electrical energy or radio signals to a circuit.

south pole. The pole of a magnet at which the magnetic lines of force enter.

space charge. The electrons accumulated in the space between the cathode and plate of a vacuum tube, usually close to the cathode.

space-charge effect. The repulsion exerted on electrons emitted from the cathode of a vacuum tube by electrons accumulated in space near the cathode.

space-charge grid. A grid located next to the cathode and made positive with respect to the cathode, for the purpose of controlling the space charge.

space cloth. Carbon-impregnated cloth used as a waveguide termination.

space current. The current made up of electrons moving from the cathode to the plate and the other positive electrodes in a thermionic vacuum tube.

spacing wave. In telegraphic communication, the emission that takes place in between the code characters or when no code characters are being transmitted.

spaghetti. Heavily varnished cloth or plastic tubing sometimes used to provide additional insulation for wires.

spark. A momentary flash due to an electric discharge through air or some other dielectric material.

spark coil. An induction coil used to produce spark discharge.

spark frequency. The number of sparks occurring per second in a spark transmitter.

spark gap. An arrangement of electrodes across which a spark will jump at a predetermined voltage.

spark-gap modulation. A modulation process that produces one or more pulses of energy by means of a controlled spark-gap breakdown for application to the element in which modulation takes place.

sparking. Intentional or accidental spark discharges, as between the brushes and commutator of a rotating machine, or between contacts of a relay or switch.

sparking voltage. The minimum voltage at which a spark discharge occurs. Also, the starting potential of a cold-cathode gas tube.

spark transmitter. A radio transmitter using the oscillatory discharge of a condenser through a coil and a spark gap as the source of its rf power.

speaker. See *loudspeaker*.

specific gravity. The weight of a substance as compared to the weight of an equal volume of water.

specific inductive capacity. Another name for dielectric constant, the ratio of condenser capacity with a given dielectric to the capacity of a similar condenser with air as the dielectric.

specific resistance. The resistance of a unit conductor having a cross-sectional area of 1 circular mil and a length of 1 foot, a circular-mil-foot. Also called resistivity.

spectrum. All frequencies used for a particular purpose. Also, any series of radiant energies (or light), arranged in order of wave length.

spectrum analyzer. A device for sweeping over a

spectrum or band of frequencies to determine what frequencies are being produced, and the amplitudes of each such component.

speech amplifier. An audio amplifier.

speech clipper. An electronic circuit for the purpose of limiting the wave crests of speech frequency signals.

speech-frequency range. Audio frequencies from about 100 to 3000 cycles. In audio equipment, the frequency range necessary for intelligible speech.

speech inverter. See *scrambled speech*.

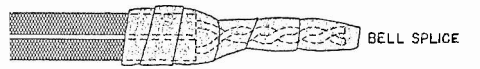
spherical. Having the form of a ball or sphere.

spherical aberration. A lens defect in which the light rays coming from a single point are brought to different focal points by the edges of the lens.

spherical wave. A wave whose wave front is a spherical surface.

spider. A highly flexible fiber ring that serves to center the voice coil of a dynamic loudspeaker between the pole pieces and at the same time provide a restoring force, causing the voice coil to return to the same starting point after each movement. Also, a small metal cap used to couple the driving pin to the apex of the cone in magnetic speakers.

spike. A spurious pulse of relatively short duration, superimposed on the main pulse. See *overshoot*.



Splices

splice. A joint between two wires that possesses mechanical strength as well as electrical conductivity.

split-anode magnetron. A magnetron in which the cylindrical anode is divided longitudinally into halves, between which extremely high-frequency oscillations are produced.

split rotor plate. See *serrated rotor plate*.

split-stator variable capacitor. A variable capacitor having a rotor section that is common to two separate stator sections.

sporadic E layer. A portion of the normal E layer of the atmosphere that sometimes breaks away and exhibits special characteristics.

sporadic reflections. Sharply defined reflections of substantial intensity from an ionized layer of the ionosphere at frequencies greater than the critical frequency of the layer. They are extremely variable in respect to time of occurrence, geographic distribution, and frequency range.

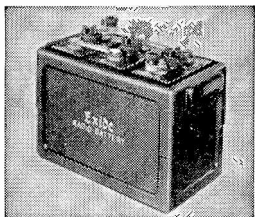
spot. The luminous area produced on the viewing screen of a cathode-ray tube by the electron beam.

spot speed. The product of the length of scanning line and the number of scanning lines per second in a facsimile system.

spottiness. The effect in a television picture resulting from variations in the instantaneous light value of the reproduced image due to

- electrical disturbances between the scanning and reproducing devices.
- spreader.** The insulating cross-arm used to space aerial wires when more than one wire is used.
- spring contact.** A relay or switch contact mounted on a spring, usually of phosphor bronze.
- spurious radiation.** Any emission from a radio transmitter at frequencies outside its assigned communication band.
- spurious response.** A condition wherein a receiver is resonant at one or more frequencies other than that to which it is tuned.
- square.** The product obtained by multiplying a number by itself. Example: 49 is the square of 7, because $7 \times 7 = 49$.
- square-law detector.** A detector whose output current is proportional to the square of the rf input voltage.
- square-loop antenna.** An FM antenna consisting of four dipoles arranged in the form of a square.
- square mil.** The area of a square whose sides are .001 inch (one mil).
- square root.** A number which, when multiplied by itself, equals a given number. Examples: 2 is the square root of 4; 13 is the square root of 169.
- square wave.** The waveform of a quantity that shifts abruptly from one to the other of two definite values, giving a square or rectangular pattern when amplitude is plotted against time.
- squealing.** A condition in which a high-pitched note is heard along with the desired radio program. It can be due to interference between stations.
- squegging oscillator.** (Pronounced to rhyme with "dredging.") See *blocking oscillator*.
- squelch.** To automatically quiet or reduce the output signal of a receiver when the applied input signal strength is less than a certain value.
- squelch circuit.** An avc circuit that reduces the noise otherwise heard in a radio receiver between signals by blocking some stage when the signal amplitude is below a value called the squelch level.
- SS loran.** A loran system synchronized by sky waves instead of ground waves.
- stability.** Freedom from oscillation.
- stabilized feedback.** Another term for negative feedback, degeneration, or *inverse feedback*.
- stacked array.** An array in which half-wave antenna elements are placed one above the other.
- stacked dipoles.** Two or more dipole antennas arranged one above the other on a vertical supporting structure.
- stage.** A circuit containing either a single tube or two or more tubes connected in push-pull, push-push, or parallel.
- stage-by-stage elimination method.** A method of servicing receivers similar to the circuit disturbance method except that the test signal is introduced by means of a test oscillator.
- stage efficiency.** The ratio of useful power delivered to the load (ac) and the plate power input (dc).
- staggered tuning.** Interstage coupling circuits of a video i-f amplifier are said to be staggered when they are tuned to different frequencies within a desired pass band. Staggered tuning is used to give broadband response.
- standard de-emphasis characteristic.** The amount of de-emphasis necessary to correct standardized pre-emphasis. In FM, a response, decreasing as the modulating frequency increases, at a rate equal to that provided by a simple R-C circuit having a time constant of 75 microseconds.
- standard pre-emphasis characteristic.** A standardized amount of pre-emphasis. Especially in FM, a response, increasing as the modulating frequency increases, at a rate equal to that provided by a simple coil-resistor circuit in the modulating source having a time constant of 75 microseconds.
- standard test output.** The output power into a standard dummy load at which a receiver is tested. For receivers that can produce more than 1 watt of undistorted output power, it is .5 watt. For receivers that can produce no more than 1 watt, it is .05 watt.
- standing wave.** The wave-like distribution of voltage or current along a transmission line as the result of the interaction between the wave from the source and the one reflected from the load, when there is a mismatch at the load end of the transmission system.
- standing wave ratio (SWR).** The ratio of the voltage maximum to the voltage minimum along a transmission line.
- stand-off insulator.** An insulator used to support a wire at a desired distance away from the support on which the insulator is mounted.
- starting anode.** An electrode used to establish the initial arc or to prevent extinction in a mercury-arc rectifier or similar tube.
- static.** Interfering noises heard in a receiver due to waves created by atmospheric electrical disturbances such as discharges of lightning.
- static characteristic.** The characteristic of a tube when supplied only with dc operating voltages (no signal voltages).
- static charge.** An electric charge accumulated on an object, usually by friction.
- static eliminator.** A device designed to attenuate the effect of static interference in a receiver or other electronic equipment.
- static machine.** A machine for generating electric charges.
- station.** An assembly of radio transmitting equipment and its transmitting antenna.
- stationary wave.** See *standing wave*.
- station selector.** The switch or tuning element in the receiver used to select the desired signal.
- stator.** The fixed set of plates in a variable condenser. Also, the non-rotating part of an electric motor or generator.
- steady state condition.** Normal operation reached by a device after the transients produced as a result of turning it on have died out.
- steatite.** Soapstone talc. A mineral consisting chiefly of a silicate of magnesium, with excellent insulating properties.
- step-down transformer.** A transformer in which the secondary winding has fewer turns than the primary, so that the secondary delivers a lower voltage than is applied to the primary.
- step-up transformer.** A transformer in which the secondary winding has more turns than the primary, so that the secondary delivers a higher voltage than is applied to the primary.

storage battery. One or more secondary or storage cells connected together, usually in series.



Courtesy Ezide

Storage Battery

storage cell. A secondary cell. More specifically, one of the cells in the ordinary storage battery, capable of being recharged.

storage-type camera tube. A television camera tube in which the elemental areas on the photosensitive plates build up their charges gradually, developing a picture signal proportional to the time of charging of the plates by light from the scene.

straight-line characteristic. Any action that can be represented by a straight line on a linear graph, that is, when one quantity varies in direct proportion to another.

strain. The change of shape, size, or form caused by applied force.

strain insulator. An insulator designed to withstand the tension in a guy wire, antenna, or other stretched wire, used to break up the wire into insulated sections.

strand. One of the small wires in a group of wires twisted or braided together.

stranded wire. A number of small wires twisted or braided together and used as a single conductor.

stray capacity. Capacity that exists between parts, between wires, or between a chassis and various parts and wires.

stray field. Stray inductance. Leakage magnetic flux that spreads outward from an inductor and does no useful work.

stroking. In television, a broad streak following an outline representing a sharp change in shade from light to dark or vice versa. The streak is intermediate in shade and is caused by inability of the system to reproduce the change as rapidly as necessary.

stress. The force that opposes a displacement or distortion in the shape of a substance.

striking potential. The grid potential of a gas-filled triode at which plate current begins flowing.

stroboscope. An instrument used to permit visual inspection of vibrating or revolving objects by illuminating them periodically, as they reach the same definite points in their rotation or recurring movement.

strobotron. A glow lamp that is made to produce accurately timed flashes of light that permit visual inspection of high-speed moving parts.

stub. A shorted or open impedance path between the two conductors of a transmission line or in a wave guide. It is adjustable as to position so as to match the impedance of an antenna or transmitter to that of a transmission line. Also, a quarter-wave length of transmission line used between a transmission line and either its source or load, used for imped-

ance matching by making connections at the proper points along its length. Also, an open quarter wave or shorted half wave length of transmission line, connected across the antenna terminals of a receiver so as to act as a short circuit at the frequency of an interfering station.

studio. A room in which programs originate.

stylus. A specially shaped needle used to cut grooves and record sound waves in wax or prepared record blanks.

stylus drag. The effect of the friction between the record surface and the reproducing stylus.

stylus force. Effective weight of the reproducer or the force in the vertical direction on the stylus when in operating position.

subcarrier. An intermediate wave modulated by facsimile signals and in turn used to modulate the main carrier, either alone or in conjunction with subcarriers for other channels.

subharmonic. A frequency that is a fraction of the fundamental frequency. Thus, the second subharmonic is $1/2$ the fundamental frequency; the third subharmonic is $1/3$, etc.

subject copy. The material in graphic form to be transmitted in facsimile reproduction.

subscript. A small number or letter written at the right of and below another letter, for distinguishing purposes. Example: In X_L and X_C , the subscripts L and C serve to distinguish inductive reactance (X_L) from capacitive reactance (X_C); in $R = R_1 + R_2 + R_3 + R_4$, numeral subscripts serve to distinguish different resistor values. X_L is pronounced "X sub L"; R_3 is pronounced "R sub three" or "R three."

subtraction. The process of finding the numerical difference between two quantities or numbers.

super. Popular name for superheterodyne receiver.

superaudible. Having a frequency above approximately 20,000 cycles per second, beyond normal hearing range. Also called supersonic.

superaudio frequency. A sound-wave frequency above 20,000 cycles per second.

super-control tube. See *variable-mu tube*.

superhet. Popular name for a superheterodyne receiver.

superheterodyne receiver. A radio receiver in which the incoming modulated rf signal is mixed with a local oscillator signal in a frequency converter section where it is converted into a fixed, lower frequency signal called the intermediate-frequency signal of the receiver. This modulated i-f signal is given very high amplification in the i-f amplifier stages, then fed into the second detector for demodulation.

super high frequency (shf). A frequency in the band between 3000 mc and 30,000 mc.

superimpose. To put one over another, as television images, in such a way that they may both be seen, intermingled.

super-regenerative detector. A form of regenerative detector in which the feedback is periodically reduced by a quenching frequency to prevent oscillation and still maintain high sensitivity.

super-sensitive relay. A relay that operates on a current value less than about 250 microamperes ($1/4$ ma).

supersonic frequency. A frequency above the audible range.

supersonic vibrations. Vibrations that cannot be heard by the unaided human ear because they are above the audible frequency range.

supply. A voltage source.

suppressed carrier transmission. A system of transmission used in telephony in which the carrier component of the modulated wave is suppressed, only the side frequencies being transmitted.

suppressor. A resistor inserted in series with the spark-plug lead or the distributor lead of an automobile engine to suppress spark interference that might otherwise interfere with reception of radio programs in the auto radio set. Also, a resistor or choke coil used in a radio circuit to suppress oscillations.

suppressor grid. A grid placed between the screen grid and the plate of a vacuum tube and maintained at or near cathode potential, in order to force secondary electrons back to the plate.

surface defects. Defects readily visible on top of the radio chassis or in the connections to a radio, such as: tube top cap off; disconnected antenna lead-in; a dead tube, etc.

surface leakage. A leakage of current over the surface of insulation.

surface noise. The noise reproduced in playing a record due to rough particles in the record material and/or irregularities in the walls of the groove left by the cutting stylus.

surge impedance. The impedance in ohms at the input of an infinitely long line, or of a practical line with its far end closed by a matching impedance. It is equal to $\sqrt{L/C}$ of the line for all but very low frequencies. Also called characteristic impedance.

surges. Sudden increases of current in a power line or circuit.

susceptance. The reciprocal of reactance.

sweep. The motion of an electron beam over the screen of a cathode-ray tube.

sweep circuit. An oscillator circuit that generates a voltage having a sawtooth waveform suitable for making the electron beam of a cathode-ray tube sweep across or up and down the fluorescent screen.

sweep generator. A generator of a radio-frequency signal, the frequency of which varies above and below the mean frequency at a rapid and constant rate.

sweep voltage. The periodically varying voltage produced by a sweep oscillator.

swinging. A momentary variation in the frequency of a radio wave.

swinging arm. A mounting and feed used to move the cutting head at a uniform rate across the recording disc in some sound recorders.

swinging choke. An iron-core choke operated with an almost saturated core, in order to make the inductance vary or swing as the average current changes.

switch. A device for opening and closing an electrical circuit, or for changing the connections between parts or circuits.

symbol. A simple design used to represent a part on a schematic diagram. Also, a letter used in formulas to represent a particular quantity.

symmetrical. Balanced. Equal on each side of a normal or center line.

sync. See *synchronizing*.

sync clipper. A vacuum tube circuit that is biased so as to remove the sync signals from the composite video signal.

sync generator. Electronic equipment designed to produce the driving, blanking, and synchronizing pulses necessary to the operation of a television system.

Synchroguide. A control circuit for horizontal scanning in which the sync signal, oscillator voltage pulse, and the scanning voltage are compared and kept in synchronism.

synchronism. The state of being synchronous.

synchronization. The process of causing to be synchronous. Specifically, the process of keeping the image-reconstructing action of a television or facsimile receiver in step with the corresponding action at the transmitter.

synchronized. In step with.

synchronizing. Causing two elements of a system to coincide in speed, frequency, relative position, or time.

synchronizing generator. An electronic generator that supplies synchronizing pulses to television studio and transmitter equipment.

synchronizing pulses. In television, the portions of the transmitted signal that control horizontal and vertical scanning of the receiver. See *horizontal* and *vertical synchronizing pulses*.

synchronizing separator. The circuit that separates the control pulses from the video signals.

synchronizing signals. Electrical pulses used to keep a television or facsimile receiving system in step with the transmitting system, so that the picture or scene will be reconstructed properly.

synchronous. Simultaneous in action and in time (in phase).

synchronous condenser. A synchronous motor that is over-excited so that it produces a leading current, used to correct power factor where inductive loads are across the power line.

synchronous switch. A circuit in which thyratrons control the operation of ignitrons in such applications as resistance welding.

synchronous vibrator. A vibrator that serves the dual function of converting a low dc voltage to a low ac voltage and at the same time rectifying a high ac voltage.

sync inverter. A vacuum tube circuit that produces a phase shift of 180° of the sync pulses to provide the necessary polarity for control of the scanning oscillator.

sync limiter. A vacuum tube circuit that produces sync pulses of uniform height.

sync segregator. The circuit used to separate the horizontal from the vertical sync pulses.

sync separator. See *sync clipper*. Also, a *sync segregator*.

synthesis. The building up of a whole out of parts or elements, as a complex waveform by superimposition of harmonics on a fundamental frequency.

T

table model receiver. A receiver having a cabinet of suitable shape and size for placing on a table.

tachometer. An instrument for measuring rotational speed in revolutions per minute.

- talk-listen switch.** A switch used in intercommunication systems to enable the operator to use the receiving loudspeaker as a microphone.
- tandem.** See *cascade*.
- tangent (tan).** A trigonometric function. The tangent of an acute angle of a right triangle (written $\tan \theta$) is equal to the opposite side divided by the adjacent side.
- tank circuit.** An L-C resonant circuit capable of storing electrical energy at its resonant frequency.
- T antenna.** A flat-top antenna, the lead-in of which is taken from the center of the horizontal portion.
- tantalum.** A refractory metal possessing the property of absorbing gases, used for grids and plates of power tubes.
- tap.** A connection made somewhere along an inductance or resistance, other than at the ends.
- taper.** Distribution of resistance over the range of rotation of a volume or tone control.
- tape recorder.** An electronic instrument for the recording and playing back of sound. An audio-modulated magnetic field influences the magnetization of particles of iron in a moving paper or plastic tape in accordance with the amplitude of the audio frequency signal. For playback, the tape is moved between the poles of the playback device, causing field fluctuations that can be amplified.
- tape transmitter.** A code-transmitting device actuated by pre-punched paper tape.
- tapped control.** A volume or tone-control potentiometer having a fixed tap somewhere along the resistance winding for the purpose of providing fixed bias or automatic bass compensation.
- tapped resistor.** A fixed resistor with extra terminals along the resistance element to provide various voltage values needed in voltage-divider applications.
- tap switch.** A multipoint switch.
- target.** The electrode that collects electrons in a Farnsworth television dissector tube. Also, the fluorescent screen in a tuning-eye tube.
- tearing.** An undesirable effect in a received television picture in which groups of lines are displaced, giving the appearance of a torn picture. Caused by unstable horizontal synchronization.
- teletograph.** A device that converts handwriting into electrical impulses at the transmitting position, and back to handwriting at the receiving position.
- television camera.**
- television broadcast.**
- television projector.** A device used to televise motion-picture film.
- telegenic.** Of a subject or model, suitable for television.
- telegraph-modulated wave.** A continuous wave that is varied in amplitude or frequency by means of telegraphic keying.
- telegraph sounder.** A telegraph receiving device that converts code signals into sounds.
- telegraphy.** Communication by code signals sent by electrical or electronic means, with or without connecting wires.
- telephone.** A device containing a microphone for converting sound waves into electrical signals, and an earphone receiver for producing sound from electrical signals.
- telephony.** An electrical method of reproducing sounds, especially those of the voice, at a distance.
- telephotography.** Radio or wire transmission of still pictures or photographs.
- telephoto lens.** A lens used to produce large pictures of an object quite distant from the camera.
- Teletrician.** A graduate of the National Radio Institute, thoroughly trained in television theory and service.
- teletypewriter.** A printing telegraph instrument having a typewriter keyboard for sending messages, and a motor-driven signal-actuated mechanism for printing received messages directly.
- televise.** To convert a scene or image into a television signal.
- television.** The transmission and reception of a rapid succession of images of fixed or moving objects by means of radio waves traveling through space or over wires.
- television camera.** In a television system, an assembly consisting of a pickup tube, sweep chains, preamplifier, and a means of focusing the image on the pickup tube.
- television channel.** A band of frequencies 6 mc wide, assigned to a television broadcast station.
- television test chart.** A chart placed before the camera of the transmitter, having geometric patterns that enable the observer to determine the resolution and linearity of the receiver.
- televisor.** The scanning apparatus used in a mechanical television system.
- temperature coefficient.** The change in characteristics of a substance for each degree Centigrade change in temperature.
- temperature coefficient of resistance.** The change per ohm in the resistance of a given material for each degree of change in the temperature.
- temperature-compensating condenser.** A condenser used to compensate for reactance changes in oscillator circuits due to changes in temperature, being designed to change in capacity in the opposite manner so the reactance change will be canceled.
- temperature control.** A relay actuated by a thermostat.
- temperature relay.** A relay that functions when the temperature of equipment associated with the relay changes to a predetermined value.
- temperature saturation.** Also known as filament saturation. The condition in which increasing the temperature of the cathode does not increase the plate current because the space charge forces the excess electrons to return to the cathode as rapidly as they are emitted.
- tension.** Potential difference or voltage. Also, a force causing or tending to cause extension.
- term.** A portion of an algebraic expression that is separated from other parts by a plus or minus sign. Example: In the expression $17a^2 - 3a + 2b^2$, the terms are $17a^2$, $3a$, and $2b^2$. Like terms have the same literal parts (the same letter combinations). Thus, the expression $17a^2x + 6.7a^2x - 2a^2x$ contains all like terms, and they can be combined by direct addition and subtraction to give $21.7a^2x$. Unlike terms contain different letter combinations, and cannot be combined directly by ad-

dition and subtraction. Example: $17ab + 8R^2 + 3x$.

terminal. A point to which electrical connections are made.

terminal impedance. The impedance measured at the input or output terminals of a device.

terminated line. A transmission line terminated in the characteristic impedance of the line.

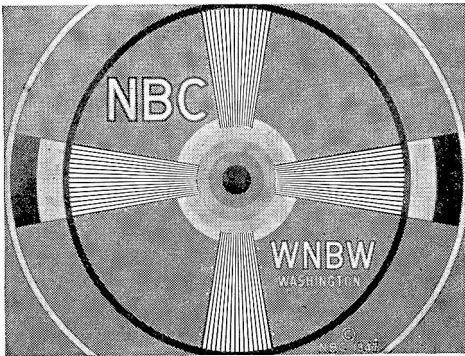
termination. The load connected to the output end of a transmission line.

Tesla coil. An air-core transformer having a few turns of heavy wire as the primary and many turns of fine wire as the secondary. The oscillatory discharge across a spark gap applied to the primary results in an extremely high value of high-frequency voltage across the secondary, which is capable of producing a brush discharge between widely separated electrodes in air.

test board. A board or panel provided with instruments, terminals, and equipment for testing electronic apparatus.

test lead. A flexible insulated lead used chiefly for connecting meters and test instruments to a circuit under test.

test oscillator. A test instrument that will generate an unmodulated or tone-modulated radio-frequency signal at a desired frequency. Also called a signal generator or an all-wave signal generator.



Courtesy NBC

Television Test Pattern

test pattern. A geometric design periodically transmitted by a television station intended to facilitate adjustment of a television receiver.

test probe. See *test prod.*

test prod. A sharp metal point provided with an insulated handle and a means for connecting the point to a test lead. It is used for making a touch connection to a circuit terminal.

test set. A combination of instruments needed for making a particular combination of tests or for servicing a particular type of electrical equipment.

tetrode. A four-electrode vacuum tube.

TE waves. Transverse electric waves. Electromagnetic waves in a wave guide when the electric field waves are transverse, and the magnetic field is in the direction of propagation.

Theremin. An oscillator whose output frequency and amplitude are variable, and are controlled

by capacity changes, as by moving one's hands with respect to a rod or loop. An electronic musical instrument.

thermal agitation. Tiny pulses of electron current produced by the random movement of free electrons in a conductor, due to heat.

thermal flasher. An electric device that opens or closes a circuit automatically at regular intervals owing to alternate heating and cooling of a bimetallic strip.

thermal instrument. An instrument in which current is measured by sending it through a fine wire, which is thereby heated, and the resulting expansion or sag of the wire is used to deflect the meter pointer. Also called hot-wire instrument.

thermionic. Relating to electron emission under the influence of heat.

thermionic emission. Emission of electrons from an electrode under the influence of heat.

thermionic tube. A vacuum tube in which the cathode is heated for electron-emitting purposes.

thermistor. A resistor element consisting of metallic oxides in inert binders, which have very high negative temperature coefficients.

thermocouple. A pair of dissimilar conductors so joined as to produce a voltage when the junction is heated.

thermocouple ammeter. An ammeter dependent for its indications on the voltage produced in a thermocouple when heated by the current to be measured.

thermogalvanometer. An instrument for measuring small high-frequency currents by their heating effect.

thermometer. An instrument for measuring temperature.

thermopile. A unit consisting of a number of thermocouples connected in series to increase the voltage sensitivity.

thermostat. A device used to open or close circuits with changes in temperature.

third harmonic. A sine-wave component having a frequency three times that of the fundamental frequency of a complex wave.

thoriated filament. A vacuum tube filament made by compounding thorium and tungsten.

thorn needle. A soft playback point or phonograph needle, such as a cactus or fiber needle.

thread. The material cut from a phonograph disc by the recording stylus during recording. Also called chip.

three-band receiver. A radio receiver having three different tuning ranges.

three-phase current. Current delivered through three wires, with each wire serving as the return for the other two and with the three current components differing in phase successively by one-third of a cycle, or 120 electrical degrees.

three-pole switch. An arrangement of three single-pole switches coupled together to make or break three contacts simultaneously.

three-wire system. A direct-current or single-phase alternating current system comprising three conductors, one of which (the neutral wire) is maintained at a potential midway between the potential of the other two.

threshold. The point just at the verge of observation by the senses or by an indicator, or the

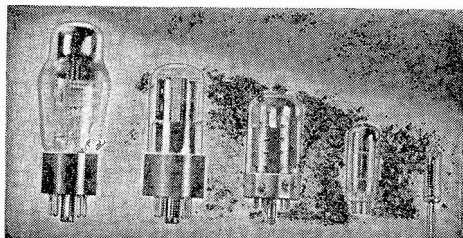
- point at which a circuit action will be initiated.
- threshold of audibility.** The loudness level at which sound is just barely heard.
- threshold of feeling.** The loudness level at which sound is felt rather than heard.
- throat microphone.** A contact microphone that is strapped to the throat and operated by throat vibrations.
- throw-out spiral.** A blank spiral groove cut in an eccentric manner at the end of a recording; provided to actuate the mechanism of an automatic record changer.
- thump.** A telegraph key click.
- thyatron.** A grid-controlled gaseous tube.
- tickler.** A coil connected in the plate or grid circuit for the purpose of feeding a portion of the amplified signal current back into the grid circuit by induction for repeated amplification.
- tie-down point.** A frequency at which a receiver is aligned. Also, sometimes a *tie point*.
- tie point.** An insulated terminal used for connecting a number of parts together.
- tier array.** An arrangement of antennas one above the other, used chiefly in ultra-high frequency work.
- tight coupling.** The closest possible coupling between two circuits under given conditions.
- tilting.** An up or down movement of a television camera.
- time constant.** In a capacitive-resistive circuit, the number of seconds required for the capacity to receive 63% of its full charge after the emf is applied. The time constant is equal to the product of the circuit's capacity in farads and its resistance in ohms. In an inductive-resistive circuit, the number of seconds required for the current to reach 63% of its final value after the emf is applied. The time constant is equal to the circuit's inductance in henrys divided by its resistance in ohms.
- time delay.** The time that elapses between the time an action should occur and the time at which it actually does occur.
- time-delay circuit.** A circuit that delays the transmission of a pulse, a signal, or a portion of a signal for a definite desired period of time.
- time-delay relay.** A relay whose contacts open or close a specified length of time after the controlling pulse has been applied.
- time gate.** A transducer that gives output only during chosen time intervals.
- time multiplex.** Successive transmission of pulse samples of each of several signals.
- time switch.** A time-controlled switch. A timer.
- timing axis oscillator.** An oscillator circuit that generates a sawtooth voltage for the horizontal deflecting plates or horizontal deflecting coils of a cathode-ray tube.
- finned wire.** Copper wire that has been coated with a layer of tin or solder to simplify soldering.
- tinsel cord.** A highly flexible insulated cord in which the conductor is composed of strips of thin metal foil, or tinsel, wound around a strong but flexible central insulating cord.
- tip.** The contact at the end of a telephone-type plug. Also the soldering surfaces of a soldering iron.
- tip jack.** A small receptacle into which a metal plug can be inserted to complete a circuit.
- tip plug.** A small plug that fits into a tip jack.
- TM waves.** Transverse magnetic waves. Electromagnetic waves in a wave guide, when the magnetic field is transverse, and the electric field waves are in the direction of propagation.
- T-network.** A network composed of three impedance branches connected two in series with one side of a line, the third across the line between the other two.
- toggle switch.** A small switch operated by means of a lever that is joined to the contact arm in a knee joint in such a way that the contact fingers move in the same direction as the force actuating the lever.
- tolerance.** The permissible variation from a rated or assigned value.
- tone.** The general character of a reproduced sound as it affects the human ear; the quality of sound. Also, a single-frequency audio sound.
- tone arm.** In a record player, phonograph, or changer, the arm that contains the cartridge and stylus.
- tone control.** A circuit control sometimes provided on a receiver to permit strengthening the response either at low or at high audio frequencies at will.
- tone generator.** An audio-frequency signal generator.
- tone-modulated wave.** An interrupted continuous wave, which is a continuous wave modulated at an audio frequency.
- tone modulation.** Modulation of a carrier with a fixed audio-frequency tone.
- top cap.** A metal cap sometimes placed on the top of a vacuum tube and connected to one of the electrodes.
- top-loaded antenna.** A vertical antenna having the top structure enlarged to increase the apparent length.
- toroid.** Ring-shaped. A doughnut-shaped coil.
- torque.** The force that produces rotation.
- tower.** A tall metal structure used to support an antenna, or which itself is an antenna.
- T-pad.** A resistive T-network used for providing attenuation and/or impedance matching.
- tracer.** A thread of contrasting color in wire insulation that aids in identification and tracing of the wire during maintenance and servicing of the equipment.
- tracking.** A term used to indicate how the tuned circuits in a receiver follow the frequency indicated by the tuning dial pointer as the receiver is tuned over its entire tuning range.
- transceiver.** A radio device used for both transmitting and receiving.
- transconductance.** The effect on one electrode current of an ac voltage on another electrode. Mutual conductance. The most important is the control-grid to plate transconductance, measured by the ac grid voltage producing it.
- transcription.** An electrical recording.
- transducer.** A device that transfers energy from one system to another.
- transfer relay.** A relay controlled by and controlling other relays.

- transformer.** Two or more coils mounted on a common support in such a way that the magnetic lines of force produced by the flow of alternating or pulsating direct current through one coil will pass through the other coil and induce in it a corresponding ac voltage.
- transformer-coupled amplifier.** An amplifier using transformers for coupling.
- transformer oil.** An oil in which windings of large power transformers are immersed for cooling and insulation, and to prevent oxidation.
- transient oscillation.** A momentary oscillation occurring in a circuit during switching, or at a sharp change in the signal.
- transient response.** The manner in which an electrical circuit responds to sudden changes in applied potential.
- transients.** Erratic changes in voltage or current. Also, a momentary voltage or current surge.
- transient time.** The time necessary for an electrical circuit to reach a normal operating condition after being turned on.
- transistor.** A unit consisting of a semi-conducting material having a point contact with one or more wires, used in place of tubes in some applications involving rectification, detection, amplification, or oscillation. No filament or heater voltage is required.
- transit angle.** The product of angular frequency and transit time.
- transit time.** The time taken by an electron to pass through some specific area.
- transition frequency.** The frequency at which the changeover from constant-amplitude recording to constant-velocity recording takes place.
- transitron oscillator.** A negative-resistance oscillator similar to a dynatron, in which the inner grid is used as an anode, the outer grid as a control element, and the plate as a collector anode.
- translucent.** Permitting the passage of light, but so scattering the rays that objects cannot be clearly seen.
- transmission.** Transfer of electric energy from one location to another through conductors or by radiation or induction fields.
- transmission level.** The ratio of the power at a given point in a transmission system to the power at some point in the system chosen as a reference point.
- transmission line.** Any set of conductors used to carry rf or af signals or energy from one location to another.
- transmission loss.** The loss of power suffered by a transmitted wave in passing along a transmission path or through a circuit or other device.
- transmission unit.** The *decibel*.
- transmitter.** A comprehensive term applying to all of the equipment used for generating, amplifying, and radiating an intelligence signal into space.
- transparent.** Permitting the passage of light rays without scattering.
- transpose.** To interchange position.
- transposition.** Interchanging the relative positions of wires to neutralize the effects of induction to or from other circuits. In two-wire parallel lead-ins for an antenna, to minimize radiation from the lead-in during transmission, or to minimize interference pickup by the lead-in during reception.
- transverse electric waves.** See *TE waves*.
- transverse magnetic waves.** See *TM waves*.
- transverse wave.** A wave in which the displacement is crosswise to the direction of propagation.
- trapezoidal.** Having the form of a trapezoid, a plane four-sided figure with two of the sides parallel.
- travelling-wave tube.** A vacuum tube in which the signal is caused to follow a wire helix. An electron stream directed down the center of the helix interacts with the electric field of the signal to cause bunching, which in turn amplifies the signal.
- treble.** The higher audio frequencies. The higher audible tones.
- triangulation.** A method of fixing the position of an aircraft or surface vessel by taking bearings with a radiocompass on at least two fixed land stations.
- trickle charge.** The continuous charging of a storage battery at a low rate, approximately equal to the rate of internal loss, to maintain it in a fully charged condition.
- trickle charger.** A device, usually a rectifier operating from an ac power line, designed to charge a battery continuously at a low rate.
- trigger circuit.** A multivibrator circuit in which either of the two tubes can operate stably, but the triggering of either tube cuts off the current of the other. The flip-flop action is produced by a trigger pulse in the grid of either tube.
- triggering.** Starting action in a circuit, which then continues to function for a predetermined time under its own control.
- trigonometric function.** The ratios that exist between the various sides and angles of a right triangle.
- trigonometry.** A branch of mathematics that deals with the relations existing among the angles and sides of triangles.
- trimmer condenser.** A small semi-adjustable condenser used in the tuning circuits of radio receivers and other radio apparatus to permit accurate alignment.
- triode.** A three-electrode vacuum tube.
- triode-pentode.** A vacuum tube having a triode and a pentode in the same envelope.
- tripping device.** Any mechanical or electromagnetic device used to open a circuit breaker or starter, either when certain abnormal electrical conditions occur or when actuated manually.
- tri-tet oscillator.** A crystal oscillator using electron coupling to the output circuit, popular with amateur radio operators because it has strong harmonics that make it ideal for multi-band operation.
- troposphere.** That part of the earth's atmosphere extending outward from the earth for about six miles, in which temperature generally decreases with altitude, clouds form, and convection is active.
- tropospheric wave.** A radio wave reflected by some part of the troposphere.
- trough.** In a modulated wave, the regions of minimum output. In the atmosphere, the space between two ionized reflecting layers.
- TR switch.** Transmit-receive device to prevent application of full transmitter power to receiver input.

true power. The power measured by a wattmeter, taking phase into consideration. In a reactive circuit it is the product of voltage times current times a power factor.

trunnion. One of two opposite projecting pivots, such as those used to support a phono pickup arm.

tube. An electronic device in which conduction by electrons takes place through a vacuum or a gaseous medium within an air-tight glass or metal envelope.



Courtesy Sylvania

Tubes

tube heating time. The time required for a tube to reach normal operating temperature.

tube noise. Noise originating within a vacuum tube, such as microphonics and shot-effects.

tube tester. An instrument used to test the condition of radio tubes.

tube voltage drop. In a tube, the plate-cathode voltage during the conducting period.

tubular condenser. A paper or electrolytic condenser having as its plates long strips of foil rolled into a compact tubular shape.

tuned antenna. An antenna made to resonate at the desired operating frequency.

tuned circuit. A resonant circuit, consisting of a coil and condenser that are preset or can be adjusted to give resonance at a desired frequency.

tuned filter. A resonant circuit used to attenuate signals at the resonant frequency.

tuned-grid oscillator. An oscillator whose frequency is determined by a parallel-tuned tank in the grid circuit to which the plate circuit is coupled to provide the required feedback.

tuned-grid, tuned-plate oscillator. A vacuum-tube oscillator having a parallel resonant circuit in series with the plate circuit and another parallel resonant circuit in series with the grid circuit. The grid resonant circuit is tuned to the operating frequency, and the plate resonant circuit is tuned slightly above the operating frequency, so as to act like an inductance. Oscillation is maintained by capacity feedback through the internal capacity of the tube.

tuned-plate oscillator. An oscillator whose frequency is determined by a parallel-tuned tank in the plate circuit to which the grid circuit is coupled to provide the required feedback.

tuned radio-frequency amplifier. An rf voltage amplifier circuit using tuned circuits in the coupling system.

tuned radio-frequency receiver. A receiver in which rf amplification is provided by a number of vacuum tube amplifier stages, each of which has one or more circuits that are tuned to

resonance at the incoming signal frequency by a section of the gang tuning condenser.

tuned radio-frequency stage. A stage of amplification, usually consisting of a vacuum tube and one or more tuned circuits that can be resonated to the received signal.

tuned radio-frequency transformer. A transformer having one or both windings tuned; used for coupling two rf amplifier stages.

tuned-reed frequency meter. See *Frahm frequency meter*.

tuner. A device capable of selecting the desired signal, and delivering rf, i-f, or demodulated information to some other equipment. Also, the portion of a receiver that contains circuits tuned to resonance at the received signal frequency and those tuned to the local oscillator frequency.

tungar bulb. A phanotron (hot-cathode, gas-discharge rectifier tube) having a heated filament serving as cathode and a graphite disc serving as anode in an argon-filled glass envelope, used mostly in battery chargers.

tungsten. A metal used for the filaments and other elements of radio tubes.

tuning. The process of varying the inductance or capacity in a coil-condenser circuit to provide resonance at a desired frequency. Also, the process of setting all of the tuning circuits in a radio receiver simultaneously to a desired frequency by rotating the tuning dial or pressing a button of a push-button tuner.

tuning circuit. A circuit containing inductance and capacity or an R-C network, which can be adjusted so the circuit will be responsive to a particular frequency.

tuning control. The receiver control by which the operator varies the tuned circuits of the receiver to bring in the desired sound or television program.

tuning eye. See *electron ray tuning indicator*.

tuning indicator. A device that indicates when a radio receiver is tuned accurately to a radio station.

tuning meter. A meter connected into a radio receiver circuit for use as a tuning indicator.

tuning wand. A flexible rubber or fiber rod having a brass plug in one end and a powdered-iron core at the other end, used for checking receiver alignment.

turn. In a coil, one complete loop of wire around the coil form.

turnover. When measuring ac, the difference in meter readings found when the leads of a vtvm are reversed, caused by unequal capacities between the vtvm circuits and ground.

turns-per-volt. The number of turns needed on the secondary winding of a transformer to give 1 volt of output voltage for a specified primary voltage.

turns ratio. The ratio of the number of turns in a secondary winding of a transformer to the number of turns in the primary winding.

turnstile antenna. A series of crossed horizontal doublet antennas, arranged vertically on a mast and fed 90° out of phase. Used where circular radiation patterns are desired.

turntable. In a record player or electric phonograph, the motor-driven disc on which the phonograph record is placed. In a sound recorder, the motor-driven disc on which is placed the disc to be cut.

turret. A revolving plate sometimes mounted at the front of a television camera and carrying two or more lenses of different types, used to permit rapid interchange of lenses. Also, a rotatable device on which one or more pre-tuned circuits are mounted for use in receivers, transmitters, and signal generators. Rotating the device connects a different pre-tuned circuit into the circuit and disconnects the others.

tweeter. A loudspeaker designed to handle only high audio frequencies (about 2000 to 15,000 cycles).

twin lead. A transmission line consisting of two parallel wires, molded into and held apart by rubber or plastic insulation.

twin-triode. Two triode tubes in a single envelope.

twin wire. A cable composed of two parallel-laid insulated conductors having a common covering.

twisted pair. Two insulated conductors twisted together, without a common covering.

two-band receiver. A radio receiver having two reception ranges.

two-way communication. Communication between stations each of which has both transmitting and receiving equipment.

two-way switch. A switch used for controlling electrical or electronic equipment components or circuits from either of two positions.

U

ultra. In a cathode-ray tube, the electrode or combination of electrodes to which is applied the highest dc voltage for accelerating the electrons prior to deflection.

ultra-audio oscillator. A variation of the Colpitts oscillator circuit, in which the two voltage-dividing capacitances are the plate-to-cathode and the grid-to-cathode capacitances of the tube.

ultra-high frequency (uhf). A frequency in the band between 300 mc and 3000 mc. See *radio spectrum*.

ultraviolet. A range of radiation frequencies beyond the visible spectrum at the violet, or high-frequency end.

umbrella antenna. An antenna in which the wires are guyed downward in all directions from a central mast or tower to the ground, somewhat like the ribs of an open umbrella.

uncharged. Without electrical charge. Having a normal number of electrons.

undamped oscillations. Oscillations of an electromagnetic wave whose energy source constantly restores losses incurred by the load or resulting from radiations.

undamped wave. A continuous wave.

undercutting. Cutting too shallow a groove or cutting with insufficient lateral movement of the stylus during sound recording.

underlap. The amount by which the effective height of the scanning spot falls short of the nominal width of the scanning line in a facsimile system.

underload relay. A relay that operates when the current in a circuit drops below a minimum value.

undermodulation. Incomplete modulation at a transmitter.

undistorted output. The output associated with an arbitrarily low level of distortion established for a particular test or operation.

unidirectional. In one direction only.

unidirectional antenna. An antenna designed to radiate with maximum strength or receive with maximum sensitivity in a particular direction and with minimum radiation or reception in the opposite direction.

unidirectional loop. A loop that will pick up energy from one direction only.

unidirectional microphone. A microphone that has maximum sensitivity to sounds from a particular direction and minimum sensitivity to those from the opposite direction.

unidirectional pulses. Single-polarity pulses that all rise in the same direction.

uniform line. A transmission line that has identical electrical properties throughout its length.

unilateral bearing. A bearing obtained with a radio direction finder having a unidirectional response.

unilateral conductivity. Conductivity in only one direction, as in a perfect rectifier.

unipotential cathode. A cathode to which heat is supplied by an independent heater element, so there is no potential difference along it as a result of heater current flow. An indirectly heated cathode, or equipotential cathode.

unit. A reference quantity for measuring purposes.

unit pole. A unit of measurement of magnetic strength. A unit pole repels a similar pole with a force of one dyne at a distance of one centimeter.

unity coupling. The condition in which all the magnetic flux of the primary passes through the entire secondary.

unity power factor. A power factor of 1.0 obtained when current and voltage are in phase, as in a circuit containing only resistance or in a reactive circuit at resonance.

universal motor. A series-wound motor that may be operated at approximately the same speed and output on either direct current or single-phase alternating current.

universal output transformer. An iron-core audio output transformer having a number of taps on its windings to permit matching to a wide range of load impedances.

universal receiver. A receiver capable of operating from either ac or dc power.

unloaded Q. The Q of a system when there is no external coupling to it.

unmodulated. Without modulation. The carrier signal alone, as it exists during pauses between programs.

unmodulated groove. A silent groove on a recording; a groove cut without sound.

untuned. Not resonant at any of the frequencies being used.

V

vacuum. A space from which practically all air or gas has been removed.

vacuum tube. A tube evacuated to such a degree that its electrical characteristics are essen-

- tially unaffected by the presence of residual gas or vapor.
- vacuum-tube keying.** A telegraph keying system in which a vacuum tube is placed in series with the center-tap lead of the final stage, its grid being connected to its filament through the transmitting key. When the key is open, the tube blocks and no plate current flows. Grounding the grid (closing the key) unblocks the tube, current flows, and a pulse is sent out.
- vacuum-tube voltmeter (vtvm).** A test instrument that utilizes a vacuum-tube circuit for measuring voltages without greatly affecting the circuit to which the instrument is connected.
- valve.** British for radio tube.
- V antenna.** See *vee antenna*.
- variable condenser.** A condenser whose capacity can be changed either by varying the space between plates (as in a trimmer condenser) or by varying the amount of meshing between the two sets of plates (as in a tuning condenser).
- variable coupling.** Inductive coupling of two or more coils that can be varied by moving one or more in relation to the others.
- variable-impedance tube.** See *reactance tube*.
- variable inductance.** A coil whose inductance can be changed by varying the number of turns in use, or by moving a core made of powdered iron or brass.
- variable-mu tube.** A tube having a control grid so designed that the mutual conductance varies with the C bias.
- variable resistance.** A resistance that can be changed in value while in use.
- Variac.** A transformer whose output voltage can be varied over a wide range by means of a switch and a series of taps.
- variocoupler.** A variable rf transformer consisting of two independent windings, one stationary and the other adjustable with relation to the fixed element so the mutual inductance can be changed.
- variometer.** A variable inductance having a movable coil mounted inside a stationary one. The two coils are connected in series. The total inductance of the unit can be varied continuously through a wide range of values by rotating the inner coil.
- Varley bridge.** A variation of the Wheatstone resistance bridge, used to determine distance from the bridge to the point at which a line is grounded.
- vector.** A straight line whose length is proportional to the magnitude or amount of a quantity, and whose arrow head points in the direction of motion or force of that quantity.
- vector diagram.** An arrangement of vectors showing the relations between alternating quantities.
- vector quantity.** A quantity that has both magnitude and direction.
- vee antenna.** A single-wire antenna arranged in the form of a "V." Also, an antenna consisting of four rods arranged to form two V's, lying in the same plane, with apexes pointing in the same direction, and with the corresponding sides connected in parallel.
- velocity microphone.** A microphone made up of a thin, light-weight corrugated ribbon mounted between the poles of powerful permanent magnets. Sound waves move this conducting ribbon back and forth in the magnetic field, and an af voltage is induced in the ribbon. The ribbon responds to the velocity of the air particles rather than to air pressure.
- velocity-modulated oscillator.** A vacuum-tube structure in which the velocity of an electron stream is varied in passing through a resonant cavity, called a buncher. Energy is extracted from the bunched electron stream as it passes through a second cavity resonator, called the catcher. Oscillations are sustained by coupling energy from the catcher cavity back to the buncher cavity.
- velocity modulation.** A system of varying the velocity of electrons in a stream so they bunch to form a modulated wave. Also, a television system in which the picture-tube beam current is maintained constant and the change in brightness of the reproduced picture is achieved by varying the horizontal velocity of the spot in both the picture and camera tube in accordance with the brightness of the picture on the mosaic of the camera tube.
- vernier.** An auxiliary device used with a main device to obtain fine adjustment.
- vernier condenser.** A small variable tuning condenser placed in parallel with a larger tuning condenser for the purpose of providing a finer adjustment after the large condenser has been set roughly to the desired position.
- vernier dial.** A dial in which a large rotation of the control knob makes the controlled shaft rotate only a small fraction of a revolution, permitting fine and accurate adjustment.
- vertical amplitude control.** See *height control*.
- vertical antenna.** A single vertical metal rod, suspended wire, or metal tower used as an antenna.
- vertical blanking pulse.** In television, a pulse transmitted at the end of each field to cut off the cathode-ray beam while it is returning to start the next field.
- vertical centering control.** A control provided in a television receiver or cathode-ray oscilloscope to shift the position of the entire image vertically on the screen.
- vertical deflecting electrodes.** The electrodes of an electrostatic cathode-ray tube to which voltage is applied to move the electron beam up and down (from top to bottom) on the screen.
- vertical hold control.** The control in a television receiver that adjusts the free-running period of the vertical sweep oscillator.
- vertical linearity control.** In television, a control provided for adjustment of the uniformity of distribution of picture elements in a vertical direction.
- vertical oscillator.** The sawtooth scanning generator that furnishes the required voltage or current wave for vertical scanning.
- vertically polarized wave.** An electromagnetic wave in which the electric field is perpendicular to the earth.
- vertical positioning control.** See *vertical centering control*.
- vertical radiator.** A conductor or system of conductors perpendicular to the earth, used as an antenna for transmitting or receiving.
- vertical recording.** A recording in which the groove modulation is up and down. Also called hill and dale recording.
- vertical resolution.** The definition or clarity of a television image in the vertical direction.
- vertical retrace.** The return path of the electron beam across the raster from bottom to top at the end of each field.

vertical scanning. The movement of the beam on the picture tube in the vertical direction.

vertical-scanning generator. See *vertical oscillator*.

vertical speed control. See *vertical hold control*.

vertical sweep. The downward movement of the electron beam, line by line, from the top to the bottom of a picture or scene being televised.

vertical synchronization. Making the vertical scanning at the receiver occur at the same relative time as the vertical scanning at the camera.

vertical synchronizing pulses. A series of pulses, longer in time duration than the horizontal pulses, that occur between each field and that are used to synchronize the vertical scanning oscillator.

very high frequency (vhf). A frequency in the band between 30 mc and 300 mc. See *radio spectrum*.

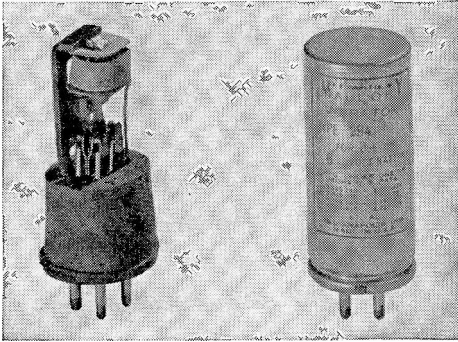
vestigial sideband. The transmitted portion of the suppressed sideband.

vestigial sideband transmission. The system of modulation in which the carrier is modulated by a complete sideband and a vestige or part of the other sideband.

vibrate. To move back and forth.

vibrating-reed frequency meter. See *Frahm frequency meter*.

vibrator. An electromagnetic device that converts a dc voltage to pulsating dc or ac.



Courtesy P. R. Mallory and Co.

Vibrator

video. A Latin word meaning "I see," applied to television parts and circuits that handle picture signals, and to signals associated with the picture being transmitted.

video amplifier. See *video-frequency amplifier*.

video frequency. The frequency of the signal voltage containing the picture information resulting from the television scanning process.

video-frequency amplifier. The amplifier stages after the video demodulator stage that build up video signal strength. Also any wide-band amplifier.

video signal. The picture signal in a television system.

view finder. An attachment on a television camera to enable the cameraman to observe the area covered by the camera.

viewing screen. In a cathode-ray oscilloscope or picture tube, the screen that converts the useful energy of the electron beam into a visible pattern.

vinculum. A straight horizontal line serving as a sign of grouping, used chiefly with radical signs and fractions. Examples: $\sqrt{R^2 + X^2}$, $\frac{ab}{a + b}$. When used with fractions, the vinculum indicates that the entire group above the line is to be divided by the entire group below the line.

virtual cathode. The space charge or electron cloud in front of the cathode in a vacuum tube.

visible radiation. Radiation corresponding to the visible spectrum of light. Roughly 4000 to 7000 angstrom units.

vitreous. Having the nature of glass.

vitreous enamel. A hard, glass-like enamel, used as an insulation on large wire-wound resistors.

voder. (Coined from Voice Operation DEMonstrator(K).) A device consisting of vacuum tube circuits and highly selective electrical filters controllable through a keyboard in such a way that speech sounds can be artificially produced.

voice coil. A moving coil attached to the diaphragm of a dynamic loudspeaker, to which audio voltages are applied.

voice frequency. The essential frequency range of ordinary speech, from about 100 to 3000 cycles.

volt. The practical unit of voltage or electromotive force. One volt will send a current of one ampere through a resistance of one ohm.

voltage. The force causing motion of electrons, measured in volts. Electromotive force.

voltage amplification. Amplification that increases the voltage of a signal rather than its power. Also, a rating obtained by dividing the ac output voltage of an amplifier stage by the ac input voltage.

voltage amplifier. An amplifier designed primarily to build up voltage without supplying any appreciable amount of power.

voltage difference. See *potential difference*.

voltage divider. A resistor having one or more fixed or adjustable contacts along the length of its resistance element, in addition to the customary two end terminals. The total available voltage is applied between the two end terminals, and desired portions of this voltage are obtained from any two terminals on the voltage divider. Also, two or more resistors connected in series to serve the same purpose.

voltage doubler. A rectifier circuit that doubles the output voltage by charging a condenser on one half-cycle and discharging it in series with the applied voltage during the next half-cycle.

voltage drop. The voltage developed across the terminals of a radio part by the flow of current through the part.

voltage feed. A method of exciting a transmitting antenna by applying voltage at a voltage loop or antinode.

voltage feedback. A form of degeneration in which the feedback is proportional to the output voltage.

voltage gain. Voltage amplification. A rating of an amplifier stage obtained by dividing the ac output voltage by the ac input voltage.

voltage multiplier. A precision resistor used in

- series with a voltmeter to extend its measuring range.
- voltage node.** Any point that has zero voltage.
- voltage regulation.** The ability of a generator or other voltage source to maintain nearly constant terminal voltage for all load values from zero to the maximum rated capacity.
- voltage-regulator tube.** A two-element gaseous tube used to maintain a constant dc potential across a circuit. Also, a resistor in a glass or metal envelope used in ac radio receivers to keep the input ac voltage to the receiver power pack essentially constant despite wide variations in the line voltage.
- voltage relay.** A relay that functions at a chosen value of voltage.
- voltage rise.** A generated or source voltage.
- voltage saturation.** The plate voltage at which all electrons emitted from the cathode are being collected by the plate so that further increases in plate voltage have no effect on plate current. Also known as plate saturation.
- voltaic cell.** Any cell that produces voltage.
- volt-ampere.** The unit of apparent power in an ac circuit containing reactance. It is equal to the voltage in volts multiplied by the current in amperes, without regard for phase.
- voltmeter.** A meter used to measure electrical pressure or voltage in volts.
- volt-ohm-milliammeter.** See *multimeter*.
- volume.** The intensity or loudness of sound.
- volume compression.** Limitation of volume range so overmodulation will not take place.
- volume control.** A device that varies the af output of a receiver or public address amplifier, thereby changing the volume of the sound produced by the loudspeaker.
- volume expander.** A manually adjusted audio circuit that can be set to increase the volume range of a radio program or phonograph record by making the loud portions of the program louder, thereby counteracting volume compression at the transmitter.
- volume indicator.** A meter that indicates the volume level of sound.
- volume-limiting amplifier.** An amplifier containing an automatic device that functions when the input volume exceeds a predetermined level to reduce the gain so that the output volume is thereafter maintained substantially constant notwithstanding further increase in the input volume. The normal gain of the amplifier is restored when the input volume returns below the limiting level.
- volume unit (vu).** A unit specifying the number of db above a reference level of 1 milliwatt (.001 watt). When a level is given in volume units, there is no need to specify the reference level since it is implied in the definition of vu. A vu is equal to a db when changes in power are involved.
- volume-unit indicator.** An instrument calibrated to read af power level in vu's when connected across a 600-ohm line.
- mounted in a circle on one or more plates of insulating material.
- walkie-talkie.** A small portable transmitter-receiver.
- water-cooled tube.** A transmitting tube whose plate element is cooled by circulating water.
- watt.** The practical unit of electrical power. In a dc circuit, the power in watts consumed by a device is equal to the applied voltage multiplied by the current in amperes. In an ac circuit, however, the power value obtained in this manner must also be multiplied by the power factor of the device.
- wattage rating.** A rating expressing the maximum power a device can safely absorb or handle.
- watt-hour.** Unit of electrical energy. One watt expended for one hour equals one watt-hour.
- watt-hour meter.** A meter that measures and registers electric energy in watt-hours or kilowatt-hours.
- wattmeter.** A meter used to measure the power in watts or kilowatts that is being consumed by a device.
- watt-second.** One watt acting for one second, equal to one joule.
- wave.** A propagated disturbance or vibration in a medium, usually periodic, as an electric wave or sound wave; a single cycle of such a disturbance.
- wave angle.** The angle at which a radio wave leaves a transmitting antenna or arrives at a receiving antenna. The two angles needed to specify the direction of a radio wave are the azimuth angle (corresponding to a direction above the surface of the earth) and the deviation angle with respect to the surface of the earth.
- wave antenna.** An antenna approximately one wave-length long at the operating frequency.
- wave band.** A band of frequencies, such as that assigned to a particular type of communication service. Waves between two arbitrarily chosen wavelengths, including waves of all lengths between the lowest and highest chosen.
- wave-band switch.** A switch used in a transmitter or receiver to change from one wave band to another.
- wave duct.** A tubular conductor capable of concentrating the propagation of radio waves within its boundaries.
- waveform.** The shape of a wave as shown pictorially or graphically, usually with reference to changes in voltage or current. Also wave shape.
- wave front.** A plane parallel to the magnetic and electrical lines of force.
- wave guide.** A tubular conductor through which ultra-high-frequency electromagnetic waves are directed. More generally, any system of material boundaries capable of guiding radio waves.

W

- wafer socket.** A socket in which the clips for gripping the tube prongs are mounted between two wafers or plates of insulating material.
- wafer switch.** A switch whose fixed contacts are



Wave Guide Section

wavelength. The distance traveled in a time of one cycle by an alternating current, sound wave, or radio wave. This is the same as the distance between successive peaks having the same polarity in the wave.

wavemeter. A device arranged and calibrated to measure or indicate the length of a radiated wave directly in meters, or its frequency.

wave trap. A device sometimes connected to the aerial system of a receiver to reduce the strength of signals at a particular frequency.

wave velocity. The velocity of propagation of energy.

wave winding. A type of winding of an armature in which each coil is connected to segments on opposite sides of the commutator.

wax. The heavy blank wax disc used in making the master record required for the production of phonograph records.

wake coupling. Loose coupling.

wedge. The convergent, fan-shaped pattern of equidistant black and white tapering lines on a television test pattern.

weighting. The artificial adjustment of measurements in order to account for factors which in the normal use of the device would otherwise be different from the conditions during measurement.

wet cell. A cell in which the electrolyte is in liquid form.

wet electrolytic condenser. An electrolytic condenser that uses a liquid electrolyte.

Wheatstone bridge. An instrument invented by Sir Charles Wheatstone, English physicist, and used for accurate resistance, inductance, or capacity measurements. The balance between the known and unknown values is indicated by the absence of current in a wire that forms a bridge or path between opposite junctions of the circuit.

wheel static. Interference in auto radios caused by friction between the tires and the pavement.

white. The signal produced at any point in a facsimile system by the scanning of a selected area of subject copy having minimum density. Also the brightest portion of a television image.

wide-angle lens. A lens having a short focal length, so as to give a wide field of view.

width. In television the horizontal dimension of the picture. Also, the time duration of a pulse (pulse width).

width control. The control on a television receiver whereby the horizontal dimension of the picture is adjusted to fill the picture tube.

Wien bridge. A bridge circuit in which capacity can be measured in terms of resistance and frequency; also useful for measuring frequency and for finding power factor of condensers.

wind charger. A generator driven by a wind-activated propeller mounted on or geared to its shaft.

winding. One or more turns of wire that make up a continuous coil.

window end. End of a TV camera tube through which the image is directed to the mosaic.

wire. A metallic conductor having essentially uniform thickness, used in radio chiefly to provide a path for electric currents between

two points. Also, the act of making connections.

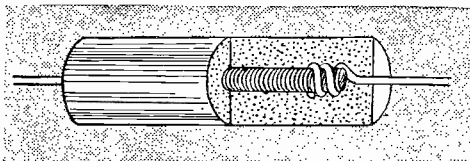
wired radio. Communication by means of a modulated rf carrier signal traveling through wires instead of through space.

wire gauge. A system of numbers used to designate wire sizes (diameters). The American Wire Gauge or AWG (formerly Brown and Sharpe or B. & S. Gauge) is in common use in this country, and has numbers ranging from 0000 as the largest size to 40 and beyond for the smallest sizes.

wireless. Radio.

wireless record player. A motor-driven turntable and phono pickup mounted in the same cabinet with an rf oscillator. The phono pickup converts a recording into af signals that modulate the rf carrier of the oscillator. The resulting signal is radiated through space as a miniature broadcast signal, and can be picked up by any radio receiver in the same house merely by tuning that receiver to the broadcast-band frequency on which the wireless record player is operating.

wirephoto. A process of transmitting facsimiles of pictures over telephone wires by converting them into and reconvertng them from electrical signals.



Wire-wound Resistor

wire-wound resistor. A resistor constructed by winding a resistance wire on an insulating form.

wobbulator. A device used with a signal generator to vary the frequency between two values periodically.

womp. A sudden flare-up of brightness in a television picture.

woof. A word-sound used by engineers to check peaks.

woofer. A loudspeaker designed particularly for the reproduction of low audio frequencies at fairly high power levels.

work. The product of the force acting on a body and the distance through which the body is moved.

working voltage. The highest voltage that can be applied continuously to a condenser without causing a breakdown of the dielectric.

wow. A flutter of low frequency, perceptible to the ear as a change in pitch during reproduction of a recording, caused by small variations in the speed of the turntable.

X

X axis. A reference axis in a quartz crystal. Also, the horizontal axis of a graph, or the horizontal sweep path in a cathode-ray oscilloscope.

X-cut. A piezoelectric crystal or quartz plate cut in such a manner that the X axis is perpendicular to its faces. Sometimes called a Curie cut.

x-rays. Rays having frequencies between the higher ultra-violet frequencies and the lower gamma rays. They are produced by the striking of cathode rays on a solid and are capable of penetrating opaque objects.

xtal. Abbreviation for quartz crystal.

Y

Yagi array. An arrangement of dipole antenna elements for television reception in which one element acts as the antenna and the others as parasitic elements (directors and/or a reflector) to improve gain and directional reception pattern.

Y-axis. In a quartz crystal, a line perpendicular to the two diametrically opposite parallel faces. It lies in a plane at right angles to the X axis. Also, the vertical axis of a graph, or the vertical sweep path in a cathode-ray oscilloscope.

Y-cut. A piezoelectric crystal cut in such a manner that the Y-axis is perpendicular to its faces. Also sometimes called a face-parallel cut or 30° cut.

Y network. A circuit of three resistors or impedances arranged in the form of a Y or star.

yoke. See *deflection yoke*.

Z

Z axis. The optical axis of a crystal, perpendicular to the X and Y axes.

Z-axis modulation. In a cathode-ray oscilloscope, the varying of the number of electrons in the beam so as to change the intensity or brightness of the spot on the screen.

Zeppelin antenna. An antenna one-half wavelength long or a multiple thereof, fed at one end by one lead of a transmission line.

zero-beat. A condition where no beat frequency results from combining two frequencies, because the two frequencies are exactly the same.

zero bias. Zero dc voltage between the control grid and the cathode of a vacuum tube, so that these two electrodes are at the same dc potential.

zero level. The reference level used when specifying a level in decibels.

Z marker. A radio beacon station installed at a radio range station to mark the exact location of the range station.

zone of silence. An area in which radio signals cannot be received.

Abbreviations of Radio Terms

A

- a.** Ampere.
- A.** Filament circuit or filament voltage supply. Antenna, ammeter, ampere, or area.
- A—.** Symbol for the negative terminal of an A battery or other filament-voltage source.
- A+.** Symbol for the positive terminal of an A battery or other filament-voltage source.
- abc.** Automatic bass compensation.
- ac.** Alternating current.
- adf.** Automatic direction finder.
- af.** Audio frequency.
- afc.** Automatic frequency control.
- agc.** Automatic gain control.
- AI.** Aircraft interception.
- AIEE.** American Institute of Electrical Engineers.
- AM.** Amplitude modulation.
- amp.** Ampere.
- ant.** Antenna.
- antilog.** Antilogarithm.
- ARRL.** American Radio Relay League.
- ATC.** Air traffic control.
- avc.** Automatic volume control.
- ave.** Automatic volume expansion.
- AWG.** American wire gauge.

B

- B.** Plate circuit or plate voltage supply. Also magnetic flux density.
- B—.** Symbol for the negative terminal of the B battery or other plate voltage source.
- B+.** Symbol for the positive terminal of a B battery or other plate voltage source.
- back emf.** Back electromotive force.
- BBC.** British Broadcasting Corporation.
- bc.** Broadcast.
- BCI.** Broadcast interference.
- BCL.** Amateur radio abbreviation for broadcast listener.
- bfo.** Beat frequency oscillator.
- B. & S.** Brown & Sharpe (wire gauge), now known as American Wire Gauge (AWG).
- btu.** British thermal unit.

C

- C.** Grid circuit or grid voltage supply. Capacity, condenser, center tap, or Centigrade.
- C—.** Symbol for the negative terminal of a C battery or other grid voltage source.

C+. Symbol for the positive terminal of a C battery or other grid voltage source.

°C. Degrees Centigrade.

CAA. Civil Aeronautics Administration.

CBS. Columbia Broadcasting System.

cc. Cubic centimeter.

cgs. Centimeter-gram-second.

CH. Choke coil.

cm. Centimeter.

coax. Coaxial.

CODAN. Carrier operated device, anti-noise.

CONS. Carrier-operated noise suppression.

cos. Cosine.

cot. Cotangent.

cp. Candlepower.

cps. Cycles per second.

cro. Cathode-ray oscilloscope.

csc. Cosecant.

cw. Continuous waves.

D

- d.** Distance. Diameter.
- db.** Decibel.
- dc.** Direct current.
- dcc.** Double cotton-covered insulation on wires.
- DET.** Detector tube or stage.
- df.** Direction finder.
- dpdf.** Double-pole, double-throw.
- dpst.** Double-pole, single-throw.
- dsc.** Double silk-covered insulation on a wire.
- dt.** Double-throw.
- DX.** A slang expression for distance.

E

- E.** Electromotive force or voltage.
- Eb.** Plate supply voltage. Also battery voltage.
- Eg.** Grid voltage of a tube.
- emf.** Electromotive force.
- emu.** Electromagnetic unit.
- Ep.** Plate voltage of a tube.
- Esg.** Screen-grid voltage.
- esu.** Electrostatic unit.

F

- f.** Frequency.
- F.** Filament.

°F. Degrees Fahrenheit.
FCC. Federal Communications Commission.
FM. Frequency modulation.
ft. Feet.

G

G. Grid of a tube. Generator. Conductance.
GCA. Ground-controlled approach.
GCI. Ground-controlled interception.
GE. General Electric Co.
Gm. Mutual conductance of a tube.
GMT. Greenwich Mean Time.
gnd. Ground.

H

h. Henrys.
H. Heater or filament of a tube. Magnetic in
tensity or magnetomotive force per cm.
hp. Horsepower.

I

I. Current.
icw. Interrupted continuous waves.
i-f. Intermediate frequency.
IFF. Identification friend or foe.
ILS. Instrument landing system.
in. Inches.
ip. Plate current of a tube.
IRE. Institute of Radio Engineers.

J

j. An imaginary number.

K

K. Cathode of a tube. Also used to indicate that
some value is to be multiplied by 1000. Also
used in formulas to represent a constant or
numerical value that does not change its value
during any one discussion.
kc. Kilocycles per second.
kw. Kilowatts.
kwh. Kilowatt-hours.
kv. Kilovolts.
kva. Kilovolt-amperes.

L

l. Length.
L. A coil or inductance in henrys.
lb. Pounds.
LC. Inductance times capacity.

M

m. Meters.
M. Mutual inductance. Also, used to indicate

that a particular value is to be multiplied by
1000.

ma. Milliamperes.
MBS. Mutual Broadcasting System.
mc. Megacycles.
mcw. Modulated continuous waves.
meg. Megohm.
mfd. Microfarads.
mh. Millihenry. Sometimes microhenry.
mho. The unit of conductance.
min. Minutes. Minimum.
mm. Millimeter.
mmf. Micromicrofarads.
MO. Master oscillator.
MOD. Modulator. Modulation. Modulated.
MOPA. Master oscillator power amplifier.
MTI. Moving target indicator.
mv. Millivolts. Sometimes microvolts.
mv/m. Millivolts per meter. Sometimes micro-
volts per meter.
mw. Milliwatts.

N

N. Number of turns on a coil.
NBC. National Broadcasting Company.
NC. No connection.
NEMA. National Electric Manufacturers Associa-
tion.

O

orth. Orthicon.
osc. Oscillator.
oz. Ounces.

P

P. Plate of a tube. Power in watts. Primary
winding of a transformer.
PA. Public address. Power amplifier.
PAM. Pulse amplitude modulation.
PDM. Pulse duration modulation.
pf. Power factor.
PFM. Pulse frequency modulation.
PIM. Pulse interval modulation.
PLM. Pulse length modulation.
PM. Permanent magnet. Phase modulation.
PPI. Plan position indicator (radar).
PPM. Pulse position modulation.
PRI. Primary winding of a transformer.
PTM. Pulse time modulation.
PWM. Pulse width modulation.

Q

Q. The merit (degree of perfection) of a coil or condenser.

R

R. Resistor; resistance in ohms.
R-C. Resistor-condenser coupling.
RC. Product of resistance and capacitance.
RCA. Radio Corporation of America.
RDF. Radio Direction Finding.
rf. Radio frequency.
RFC. Radio-frequency choke coil.
RMA. Radio Manufacturers Association. Now RTMA.
RMCA. Radio Marine Corporation of America
RTMA. Radio and Television Manufacturers Association.
rms. Root mean square.
Rp. Plate resistance of a tube.
rpm. Revolutions per minute.

S

S. Secondary winding.
scc. Single cotton-covered insulation.
sce. Single cotton covering over enamel.
sec. Secant. Seconds.
SEC. Secondary winding of a transformer.
SG. Screen grid.
shf. Super high frequencies.
sin. Sine.
SOS. International marine distress signal.
spdt. Single-pole, double-throw.
spst. Single-pole, single-throw.
sq ft. Square feet.
sq in. Square inches.
ssc. Single silk-covered.
SUP. Suppressor grid of a tube.
super. Superheterodyne.
SW. Short-wave. Switch.
SWL. Short-wave listener.
SWR. Standing-wave ratio.

T

tan. Tangent.
TE. Transverse electric.
TM. Transverse magnetic.
TPTG. Tuned-plate, tuned-grid.
TR. Transmit-receive.
trf. Tuned radio frequency.
TU. Transmission unit (replaced by db).

TV. Television.

U

uhf. Ultra-high frequency.

V

V. Volts. Voltage. Voltmeter. Vacuum tube.
vhf. Very high frequency.
VT. Vacuum tube.
vtvm. Vacuum tube voltmeter.
vu. Volume unit.

W

W. Power in watts.

X

X. Reactance.
Xc. Capacitive reactance.
Xl. Inductive reactance.
xtal. Crystal.

Y

Y. Admittance.


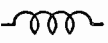


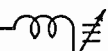


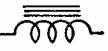
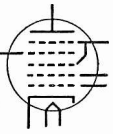


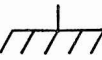



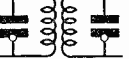
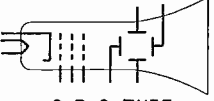



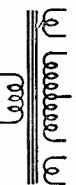







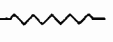





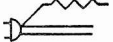

















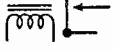
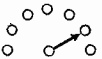
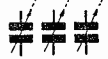

Z

Z. Impedance.

GREEK LETTERS USED IN RADIO

ϵ (epsilon) 2.718, the base of the natural system of logarithms.
 θ (theta) Angles, especially, phase angle.
 λ (lambda) Wavelength.
 μ (mu) Micro (one millionth of). Amplification factor. Permeability.
 μa Microampere.
 μf Microfarad.
 μh Microhenry.
 $\mu \mu$ Micromicro (one millionth of one millionth of).
 $\mu \mu f$ Micromicrofarad.
 $\mu \mu fd$ Micromicrofarad.
 μv Microvolt.
 $\mu v/m$ Microvolts per meter.
 μw Microwatt.
 π (pi) 3.1416, the ratio of the circumference of a circle to its diameter.
 ρ (rho) Specific resistance.
 ω (omega) Ohm. Angular velocity ($2\pi f$).
 Ω (omega) Ohm, sometimes megohm.

COMMON RADIO SYMBOLS

	BC ANTENNA		AIR-CORE COIL OR CHOKE		DIODE TUBE
	TV-FM ANTENNA		PERMEABILITY- TUNED COIL		TRIODE TUBE
	LOOP ANTENNA		IRON-CORE COIL OR CHOKE		MULTI- ELEMENT TUBE
	GROUND		AF TRANSFORMER		
	CHASSIS CONNECTION		RF TRANSFORMER		DUAL- TRIODE TUBE
	CONNECTION		I-F TRANSFORMER		C R O TUBE
	NO CONNECTION WHEN CONNECTION IS NOT DOTTED		PERMEABILITY- TUNED RF OR I-F TRANSFORMER		
	CONNECTION		POWER TRANSFORMER		TUNING-EYE TUBE
	NO CONNECTION WHEN CONNECTION IS DOTTED				PILOT LAMP
	TWISTED WIRE				PHOTOCELL
	LINE CORD PLUG		HEADPHONE		FIXED RESISTOR
	WALL OUTLET		PM DYNAMIC LOUDSPEAKER		POTENTIOMETER
	TERMINALS		ELECTRODYNAMIC LOUDSPEAKER		LINE-CORD RESISTOR
	FUSE		METER (LETTER INDICATES TYPE)		PLUG-IN RESISTOR
	BATTERY				MICROPHONE
	SPST SWITCH		FIXED CONDENSER		MAGNETIC PHONO PICKUP
	SPDT SWITCH		ELECTROLYTIC CONDENSER		CRYSTAL PHONO PICKUP
	DPST SWITCH		TRIMMER CONDENSER		QUARTZ CRYSTAL
	DPDT SWITCH		VARIABLE CONDENSER		RELAY
	ROTARY SWITCH		GANGED CONDENSER		CRYSTAL RECTIFIER

