



Glossary

Words in definitions that are *italicized* have a separate glossary entry.
A word in **bold** is defined in that entry.

73 — Ham abbreviation for “best regards.” Generally expressed at the end of a contact.

Active filter — See *filter*.

Adapters — *Connectors* that convert one type to another.

Allocations — Frequencies authorized for a particular FCC telecommunications *service*.

Alternating current or voltage (ac) — Electrical *current* or *voltage* with a direction or polarity, respectively, that reverses at regular intervals.

Amateur operator — A person named in an amateur operator/primary license station grant on the ULS consolidated licensee database to be the control operator of an amateur station.

Amateur Radio Emergency Service (ARES®) — An organization of amateur volunteers that is sponsored by the ARRL and provides emergency communication services to groups such as the American Red Cross and local Emergency Operations Centers (EOC).

Amateur service — A radio communication service for the purpose of self-training, intercommunication and technical investigations carried out by amateurs, that is, duly authorized persons interested in radio technique solely with a personal aim and without *pecuniary* interest.

Amateur station — A station licensed in the amateur service, including necessary equipment, used for amateur communication.

Amateur television (ATV) — Analog fast-scan television using commercial transmission standards (NTSC in North America).

American Radio Relay League (ARRL) — The national association for Amateur Radio.

Ammeter — A test instrument that measures *current*.

Ampere (A) — The basic unit of electrical *current*, also abbreviated amps. One ampere is the flow of one *coulomb* of charge per second.

Amplifier — A device or piece of equipment used to *amplify* a signal.

Amplify — Increasing the strength or *amplitude* of a signal.

Amplitude — The strength or magnitude of a signal.

Amplitude modulation (AM) — The process of adding information to a signal or *carrier* by varying its amplitude. Transmissions referred to as **AM phone** are usually composed of two sidebands and a carrier. Shortwave broadcast stations use this type of AM, as do stations in the Standard Broadcast Band (535-1710 kHz). AM in which only one sideband is transmitted is called *single-sideband* or *SSB* and is the most popular voice mode on the *high frequency (HF)* bands

AMSAT (Radio Amateur Satellite Corporation) — Organization that manages many of the amateur satellite programs.

Analog (linear) signal — A signal (usually electrical) that can have any amplitude (voltage or current) value, and whose amplitude can vary smoothly over time. Also see *digital signal*.

Antenna — A device that radiates or receives radio frequency energy.

Antenna matching network — see *impedance matching network*.

Antenna switch — A switch used to connect one transmitter, receiver or transceiver to several different antennas.

Antenna tuner — See *impedance matching network*.

Apogee — The point in a satellite's orbit at which it is farthest from the Earth. See *perigee*.

AGC — See *automatic gain control*.

ALC — See *automatic level control*.

Automatic Packet Reporting System (APRS) — A system by which amateurs report their position automatically by radio to central servers from which their locations can be observed.

Amateur Radio Direction Finding (ARDF) — Competitions in which amateurs combine orienteering with *radio direction finding*.

Anode — The more positively charged *electrode* of a *diode* or *vacuum tube*.

Antenna analyzer — A portable instrument that combines a low-power signal source, a frequency counter and an *SWR meter*. Also known as an **SWR analyzer**.

Array — An antenna with more than one *element*. In a **driven array** all elements are *driven elements*. In a **parasitic array** some elements are *parasitic elements*.

Attenuate — To reduce the strength of a signal. An **attenuator** is a device that attenuates a signal.

Audio frequency (AF) signal — An ac electrical signal in the range of 20 hertz to 20 kilohertz (20,000 hertz). This is called an audio signal because human hearing responds to sound waves in the same frequency range.

Automatic control — A station operating under the control of devices or procedures that ensure compliance with FCC rules.

Automatic gain control (AGC) — A circuit that automatically adjusts RF Gain in a receiver to maintain a relatively constant output volume.

Automatic level control (ALC) — A circuit that automatically controls transmitter power to reduce distortion of the output signal that can cause interference to other stations.

Automatic Repeat Request (ARQ) — The method of requesting a retransmission of data if the data is received with errors. Also known as **Automatic Repeat Query**.

Autopatch — A device that allows users to make telephone calls through a *repeater*.

Auxiliary station — A station that operates in support of another station, such as a *repeater*, by transmitting control information or relaying audio.

Balanced line — *Transmission line* in which none of the conductors is connected directly to *ground*. See *open-wire line*.

Balun — Contraction of “balanced to unbalanced” and pronounced “BAHL-un.” A device to transfer power between a balanced load and an unbalanced feed line or device, or vice versa.

Band — A range of frequencies. An **amateur band** is a range of frequencies on which amateurs are allowed to transmit.

Band-pass filter (BPF) — A *filter* designed to pass signals within a range of frequencies called the **pass-band**, while attenuating signals outside the pass-band.

Band plan — Voluntary organization of activity on an amateur band under normal circumstances.

Band-stop filter — See *notch filter*.

Bandwidth — (1) Bandwidth is the range of frequencies occupied by a radio signal. (2) FCC Part 97 defines bandwidth for regulatory purposes as “The width of a frequency band outside of which the mean power is attenuated at least 26 dB below the mean power of the transmitted signal within the band.” [Part 97.3 (8)]

Base — (1) A station at a fixed location. (2) See *transistor*.

Battery — A package of one or more *cells*.

Battery pack — A package of several individual *cells* connected together (usually in series to provide higher voltages) and treated as a single battery.

Baud — The rate at which symbols are transmitted in a *digital mode*.

Baudot — The code used for *radioteletype* (RTTY) characters.

Beacon station — An amateur station transmitting communications for the purposes of observation of propagation and reception or other related experimental activities.

Beam antenna — See *directional antenna*.

Bit error rate (BER) — The rate at which bit-level errors occur in a stream of digital data.

BJT — See *transistor*.

Block diagram — A drawing using boxes to represent sections of a complicated device or process. The block diagram shows the connections between sections. A block diagram shows the internal functions of a complex piece of equipment without the detail of a *schematic diagram*.

BNC — A type of *RF connector*.

Bonding — Connecting equipment or circuits together to keep them at the same voltage.

Break-in — Switching between transmit and receive during CW operation so that you can listen to the operating frequency between Morse *elements* (full break-in) or during short pauses in your transmissions (semi-break-in).

Breaking in — The term for joining an ongoing contact by transmitting your *call sign* during a pause in the contact.

Broadband Hamnet — Amateur system that uses reprogrammed commercial network equipment in shared bands to create self-organizing (ad hoc) data networks.

Broadcasting — One-way transmissions intended to be received by the general public, either direct or relayed.

Bug — A mechanical Morse *key* that uses a spring to send dots automatically.

Bus — An electrical conductor for distributing power or to provide a common connection.

Call — (1) Abbreviated form of *call sign*. (2) Attempt to make contact.

Call district — The ten administrative areas established by the FCC.

Call sign — The letters and numbers that identify a specific amateur and the country in which the license was granted.

Calling frequency — A frequency on which amateurs establish contact before moving to a different frequency. Usually used by hams with a common interest or activity.

Capacitance — A measure of the ability to store energy in an *electric field*. Capacitance is measured in *farads*.

Capacitor — An electrical *component* that stores energy in an *electric field*. Capacitors are made from a pair of conductive surfaces called *electrodes* that are separated by an *insulator* called the *dielectric*.

Carrier — The unmodulated RF signal to which information is added during *modulation*. Also see *modulate*.

Cathode — The more negatively charged *electrode* of a *diode* or *vacuum tube*.

Cell (electrochemical cell) — A combination of chemicals and *electrodes* that converts chemical energy into electrical energy. See *battery*.

Centi (c) — The metric prefix for 10^{-2} or division by 100.

Certificate of Successful Completion of Examination (CSCE) — A document that verifies that an individual has passes one or more exam *elements*. A CSCE is good for 365 days and may be used as evidence of having passed an element at any other amateur license exam session.

Channel — (1) A range of *frequencies* used for one radio or communications signal. (2) The structure connecting the *source* and *drain* of an *FET* and through which *current* flows.

Channel spacing — The difference in frequency between *channels*.

Characteristic impedance — The ratio of RF *voltage* to *current* in a *transmission line* that is *matched*.

Charge — Store energy in a *battery* by reversing the chemical reaction in its *cells*.

Chassis ground — The common connection for all parts of a *circuit* that connect to the metal enclosure or chassis (pronounced “*CHAA-see*”) of the circuit.

- Check in** — Register your station's presence on a *net* with the *net control station*.
- Checksum** — A method of detecting errors in digital data by including a calculated value with the data.
- Choke balun** — A type of *balun* made by forming a coaxial feed line into a coil or placing ferrite cores on the feed line, creating an *RF choke*.
- Circuit** — A conductive path through which *current* can flow.
- Circuit breaker** — A protective component that “breaks” or opens a *circuit* or *trips* when an excessive *current* flow occurs.
- Citizen's Band (CB)** — An unlicensed radio service operating near 27 MHz intended for use by individuals and businesses over ranges of a few miles.
- Closed repeater** — A *repeater* that restricts access to members of a certain group of amateurs. See *open repeater*.
- Closed circuit** — An electrical circuit with an uninterrupted path for the current to follow. Turning a switch on, for example, closes or completes the circuit, allowing current to flow. Also called a **complete circuit**.
- Coaxial cable** — Coax (pronounced *KOH-aks*). A type of *transmission line* with a single center conductor inside an outer shield made from braid or solid metal and both sharing a concentric central axis. The outer conductor is covered by a plastic **jacket**.
- Color code** — A system in which numerical values are assigned to various colors. Colored stripes or dots are painted on the body of *resistors* and other *components* to represent their value.
- Collector** — See *transistor*.
- Common** — Term for the shared reference for all voltages in a circuit. Also referred to as *circuit common*. See *ground* and *bonding*.
- Common-mode** — Currents that flow equally on all conductors of a multiconductor cable, such as speaker wires or telephone cables, or on the outer surface of shielded cables.
- Common-mode choke** — see *Choke balun*
- Communications emergency** — A situation in which communication is required for immediate safety of human life or protection of property.
- Component** — (1) A device having a specific quantity of an electrical property (such as *resistance*) or that has a specific electrical function. (2) One signal of a group that makes up a *composite* signal.
- Composite signal** — A signal with information encoded by a group of *component* signals. For example, an AM signal is a composite signal that consists of three components: the carrier and the upper and lower sidebands.
- Compression** — See *speech compression*.
- Conductor** — A material in which *electrons* move freely in response to an applied *voltage*.
- Connector** — A *component* used to connect and disconnect electrical circuits and equipment.

- Continuous wave (CW)** — Radio communications transmitted by on/off *keying* of a continuous radio-frequency signal. Another name for international *Morse code*.
- Control code** — Information in the form of data or tones used to adjust a station under *remote control*.
- Control link** — The means by which a control operator can make adjustments to a station operating under *remote control*.
- Control operator** — The person designated by the licensee of a station to be responsible for the transmissions of an amateur station.
- Control point** — The location at which the control functions of the station are performed.
- Controlled environment** — Any area in which an RF signal may cause radiation exposure to people who are aware of the radiated electric and magnetic fields and who can exercise some control over their exposure to these fields. The FCC generally considers amateur operators and their families to be in a controlled RF exposure environment to determine the *maximum permissible exposure* levels. See *uncontrolled environment*.
- Conventional current** — See *current*.
- Core** — In an *inductor*, the core is the material or space the wire is wound around or passed through.
- CORES** — Commission Registration System of the *FCC*.
- Coulomb (C)** — The basic unit of electrical charge. One coulomb is 6.25×10^{18} *electrons*. 1 *ampere* equals the flow of 1 coulomb of electrons per second.
- Courtesy tone (beep)** — A short burst of audio transmitted by a *repeater* to indicate that the previous station has stopped transmitting. It can also be used to indicate that the *time-out timer* has been reset.
- CQ** — “Calling any station,” the general method of requesting a contact with any station.
- Crossband** — Able to receive and transmit on different amateur frequency bands. For example, a *repeater* might receive a signal on 70 cm and retransmit it at 2 meters.
- CTCSS** — Continuous Tone Coded Squelch System. A low frequency tone (also called subaudible tone) required to access many *repeaters*. See *PL*.
- Current (electrical)** — The movement of electrons in response to an electromotive force, also called *electronic current*. *Conventional current* is the flow of positive charge that moves in the opposite direction of electronic current.
- Cutoff frequency** — The frequency at which a *filter's* output *power* is reduced to one-half the input power.
- Cycle** — One complete repetition of a repeating waveform, such as a *sine wave*
- CW (Morse code)** — See *continuous wave*.
- D region** — The lowest region of the *ionosphere*. The D region (or layer) acts mainly to absorb energy from radio waves as they pass through it.
- Data (digital) mode** — Computer-to-computer communication, such as by *packet radio* or *radioteletype (RTTY)*, in which information is exchanged as data characters or digital information.
- DC voltage** — A voltage with a constant *polarity*. See *direct current*.

Deceptive (or false) signals — Transmissions that are intended to mislead or confuse those who may receive the transmissions. For example, distress calls transmitted when there is no actual emergency are false or deceptive signals.

Decibel (dB) — In electronics decibels are used to express ratios of *power*, *voltage*, or *current*. $1 \text{ dB} = 10 \log_{10} (\text{power ratio})$ or $20 \log_{10} (\text{voltage or current ratio})$.

Deci (or lower case d) — The metric prefix for 10^{-1} or division by 10.

Delta loop — A loop antenna in the shape of a triangle.

Degree — A measure of angle or phase. There are 360 degrees in a circle or *cycle*.

Demodulate — To recover the information from a modulated signal by reversing the process of *modulation*. See *modulate*.

Designator — Letters and numbers used to identify a specific electronic *component*.

Detect — (1) To determine the presence of a signal. (2) To recover the information directly from a modulated signal.

Detector — The stage in a receiver in which the *modulation* (voice or other information) is recovered from a *modulated* RF signal.

Deviation — The change in *frequency* of an FM *carrier* due to a *modulating* signal. Also called **carrier deviation**.

Dielectric — The *insulating* material in which a *capacitor* stores electrical energy.

Diffraction — To alter the direction of a radio wave as it passes by edges of or through openings in obstructions such as buildings or hills. **Knife-edge diffraction** results if the dimensions of the edge are small in terms of the wave's wavelength.

Digipeater — A type of *repeater* station that retransmits or forwards digital messages.

Digital mode — See *data mode*.

Digital signal — (1) A signal (usually electrical) that can only have certain specific amplitude values, or steps — usually two; 0 and 1 or ON and OFF. (2) See *data mode*.

Digital signal processing (DSP) — The process of converting an *analog signal* to *digital* form and using a microprocessor to process the signal in some way such as filtering or reducing noise.

Diode — An electronic *component* that allows electric *current* to flow in only one direction.

Diplexer — A device that allows radios on two different bands to share a single antenna. Diplexers are used to allow a dual-band radio to use a single dual-band antenna. See *duplexer*.

Dipole — As used in Amateur Radio, the term usually refers to a *half-wave dipole* antenna.

Direct conversion — A type of receiver that recovers the modulating signal directly from the modulated RF signal.

Direct current (dc) — Electrical *current* that flows in only one direction.

Direct detection — A device acting as an unintentional receiver by converting a strong RF signal directly to voltages and currents internally, usually resulting in *radio frequency interference* to the receiving device.

Directional antenna — An antenna with an ability to receive and transmit that is enhanced in a specific (forward) direction and attenuated in one or more directions. See *front-to-back ratio* and *front-to-side ratio*.

Directional wattmeter — See *wattmeter*.

Director — A parasitic element of a *Yagi antenna* that focuses the radiated signal in the desired direction. See *reflector*.

Discharge — Extract energy from a *battery* or *cell*. **Self-discharge** refers to the internal loss of energy without an external *circuit*.

Discriminator — See *frequency discriminator*.

Dish — A curved *directional antenna* that uses a *reflector* to focus radio waves.

Distress call — A transmission made in order to attract attention in an emergency. (See *MAYDAY* and *SOS*)

Doping — Adding impurities to *semiconductor* material to change its conductive properties. **N-type** material is created if adding the impurity results in more *electrons* being available to flow as *current*. **P-type** material results if fewer *electrons* are available.

Doppler shift — A change in observed frequency of a signal caused by relative motion between the transmitter and receiver. Also called the **Doppler effect**.

Doubling — Two or more operators transmitting at the same time on the same frequency.

Downlink — Transmitted signals or the range of frequencies for transmissions from a satellite to Earth. See *uplink*.

Drain — See *transistor*.

Driven element — An antenna *element* supplied directly with power from the transmitter.

Driver — The *amplifier* stage immediately preceding a *power amplifier* in a transmitter.

Dual-band antenna — An antenna designed for use on two different amateur bands.

Dummy antenna or **dummy load** — A station accessory that dissipates a transmitted signal as heat to allow testing or adjustment of transmitting equipment without radiating a signal on the air.

Duplex — (1) Transmitting on one frequency and receiving on another, such as for *repeater* operation. (2) A mode of communications (also known as **full duplex**) in which a user transmits on one frequency and receives on another frequency simultaneously. This is in contrast to **half duplex** in which the user transmits at one time and receives at other times.

Duplexer — A device that allows bidirectional communication on closely spaced frequencies or *channels*. In a *repeater*, the duplexer also allows the transmitter and receiver to share a single antenna. See *diplexer*.

Duty cycle — The percentage of time that a signal or device, such as a transmitter, is active. **Duty factor** is the same as duty cycle, but expressed as a fraction instead of percent.

DX — Distance, distant stations, foreign countries.

DXpedition — An expedition for the purpose of making contacts from a rare or unusual location.

E region — The second lowest *ionospheric* region, the E region (or layer) exists only during the day. Under certain conditions, it may refract radio waves enough to return them to Earth.

Earth connection — An electrical connection to the Earth for electrical safety purposes. See also *ground*.

Earth station — An amateur station located on or within 50 km of the Earth's surface, intended for communications with space stations or with other Earth stations by means of one or more other objects in space.

Earth-Moon-Earth (EME) or moonbounce — A method of communicating with other stations by reflecting radio signals off the Moon's surface.

Echolink — A system of linking repeaters and computer-based users by using the Voice-Over-Internet Protocol.

Electric field — A region of space in which electrical energy is stored and in which a stationary electrically charged object will feel a force. The **electric potential** between two points in the electric field is the amount of energy required to move a single electron between those two points.

Electrode — The general term for an electrical contact or connection point.

Electromagnetic wave — Energy composed of a continuously varying *electric field* and *magnetic field* moving through space or a *transmission line*.

Electromotive force (EMF) — The force that causes *electrons* or other charged objects to move.

Electron — A negatively charged atomic particle. Moving electrons make up an electrical *current*.

Electronic current — See *current*.

Element — (1) The conducting part or parts of an antenna designed to radiate or receive *radio waves*. (2) An examination for an FCC license in the amateur service. (3) A dot or dash in the *Morse code*.

Elmer — A ham radio mentor or teacher.

Emcomm — An abbreviation for *emergency communications*

Emergency — A situation where there is an immediate threat to the safety of human life or property.

Emergency communications — Communications conducted under adverse conditions where normal channels of communications are not available.

Emergency traffic — Messages with life and death urgency or requests for medical help and supplies that leave an area shortly after an emergency.

Emission — The transmitted signal from an *amateur station*.

Emission privilege — Permission to use a particular *emission type* (such as Morse code or voice).

Emission types — Term for the different modes authorized for use on the Amateur Radio bands. Examples are CW, SSB, RTTY and FM.

Emitter — See *transistor*.

Encoding — Changing the form of a signal into one suitable for storage or transmission. **Decoding** is the process of returning the signal to its original form.

Encryption — Changing the form of a signal into a privately-known format intended to obscure the meaning of the signal. **Decryption** is the process of reversing the encryption.

Energy — The ability to do work; the ability to exert a force to move some object.

Envelope — The outline of an RF signal formed by the peaks of the individual RF cycles.

Extended-coverage receiver — A receiver that tunes frequencies from around 30 MHz to several hundred MHz or into the GHz range. Also known as a **wide-range receiver**.

F region — A combination of the two highest *ionospheric* regions (or layers), the F1 and F2 regions. The F region refracts radio waves and returns them to Earth. Its height varies greatly depending on the time of day, season of the year and amount of sunspot activity.

Farad (F) — The basic unit of *capacitance*.

Federal Communications Commission (FCC) — Federal agency in the United States that regulates use and allocation of the frequency spectrum among many different services, including Amateur Radio.

Federal Registration Number (FRN) — An identification number assigned to an individual by the FCC to use when performing license modification or renewal.

Feed line — See *transmission line*.

Feed line loss — The fraction of power dissipated as heat as it travels through a feed line.

Feed point — The point at which a *transmission line* is electrically connected to an antenna.

Feed point impedance — The ratio of RF voltage to current at the *feed point* of an antenna.

Ferrite — A ceramic material with magnetic properties used in *inductors*. Ferrite is often formed into beads or cores so that it may be placed on cables, forming an *RF choke*.

FET — See *transistor*.

Filter — A circuit or system whose effect on a signal depends on its frequency or other characteristics. A **passive filter** is constructed entirely from unpowered devices such as *resistors*, *capacitors* and *inductors*. An **active filter** also uses powered devices such as *amplifiers* or *transistors*. A **digital filter** performs the filtering functions by operating on digital data that represents a signal.

Form 605 — An FCC form that serves as the application for your Amateur Radio license, or for modifications to an existing license.

Forward power — Power in a *transmission line* traveling from a transmitter toward a *load* or *antenna*.

Fox hunting — Exercises in which participants look for a hidden transmitter (the fox) to test *radio direction-finding* skills. Also called a **bunny hunt**.

Frequency — The number of complete cycles per second of an *ac current* or *ac voltage*.

- Frequency band** — A continuous range of frequencies in which one type of communications is authorized. See *band*.
- Frequency coordination** — Allocating *repeater* input and output frequencies to minimize interference between repeaters and to other users of the band.
- Frequency coordinator** — An elected individual or group that recommends repeater frequencies to reduce or eliminate interference between *repeaters* operating on or near the same frequency in the same geographical area.
- Frequency discriminator** — A *detector* used for FM signals.
- Frequency modulation (FM)** — The process of adding information to an RF signal or *carrier* by varying its frequency. FM broadcast stations and most professional communications (police, fire, taxi) use FM. **FM phone** is used on most *repeaters*.
- Frequency privilege** — Authorization to use a particular group of frequencies.
- Frequency-shift keying (FSK)** — A method of digital *modulation* that shifts the transmitter frequency to represent the bits of digital data.
- Front-end overload** — Interference to a receiver caused by a strong signal that causes the receiver's sensitive input circuitry ("front end") to be overloaded. Front-end overload results in distortion of the desired signal and the generation of unwanted spurious signals within the receiver. See **receiver overload**.
- Front-to-back ratio (F/B)** — The ratio of an antenna's *gain* in the forward direction to that in the opposite or rear direction.
- Front-to-side ratio (F/S)** — The ratio of an antenna's *gain* in the forward direction to that at right angles to the forward direction.
- FRS** — Family Radio Service. An unlicensed radio service that uses low-power radios operating near 460 MHz and intended for short-range communications by family members.
- Fundamental** — The frequency of which all *harmonics* are integer multiples.
- Fundamental overload** — *Radio frequency interference (RFI)* caused when a strong RF signal exceeds a receiver's ability to reject it.
- Fuse** — A thin metal strip mounted in a holder. When excessive *current* passes through the fuse, the metal strip melts and opens the *circuit* to protect it against further current overload.
- Gain** — (1) Enhancing an antenna's ability to receive or radiate signals in a specific direction. (2) The ability of a component, circuit, or piece of equipment to *amplify* a signal. (3) **Mic Gain** — sensitivity of the microphone amplifier circuit. (4) **RF Gain** — sensitivity of the receiver to incoming RF signals. (5) **AF Gain** — receiver audio output volume.
- Gate** — See *transistor*.
- Gateway** — A station that serves to connect one network of stations with the Internet or another network of stations.
- General-coverage receiver** — A receiver used to listen to a wide range of frequencies, not just specific bands. Most general-coverage receivers tune from frequencies below the AM broadcast band (550 – 1700 kHz) to around 30 MHz. (See *extended-coverage receiver*.)
- Generator** — A device that uses a motor to convert mechanical energy into ac or dc electrical energy. See also *signal generator*.

- GFI** (also **GFCI**) — Ground-fault interrupting *circuit breaker* that opens a circuit when an imbalance of current flow is detected between the hot and neutral wires of an ac power circuit. An **AFCI** or arc-fault circuit interrupter opens a circuit when an arc is detected.
- Giga (or lower case G)** — The metric prefix for 10^9 or multiplication by 1,000,000,000.
- GMRS** — General Mobile Radio Service. A licensed radio service operating 460 MHz intended for family businesses and members to communicate within a city or region.
- Go-kit** — A pre-packaged collection of equipment or supplies kept at hand to allow an operator to quickly report where needed in time of need.
- Grace period** — The time allowed by the FCC following the expiration of an amateur license to renew that license without having to retake an examination. Those who hold an expired license may not operate an *amateur station* until the license is reinstated.
- Grant** — Authorization given by the FCC
- Grid square** — A locator in the Maidenhead Locator System.
- Ground** — (1) An electrical connection to the Earth (*Earth connection*) for the purposes of electrical safety. (2) A reference voltage point or surface (see *ground plane*) in a circuit or system of equipment. (3) To connect a circuit to a ground.
- Ground loss** — RF energy that is converted to heat while reflecting from or traveling through or along the Earth's surface.
- Ground rod** — A metallic rod driven into the Earth to make a **ground connection** or *Earth connection*. Also known as a **ground electrode** or **earth electrode**.
- Ground plane** — A conducting surface of continuous metal or discrete wires that acts to create an electrical image of an antenna. **Ground-plane antennas** require a ground-plane in order to operate properly.
- Ground-wave propagation** — *Propagation* in which radio waves travel along the Earth's surface.
- Ham-band receiver** — A receiver designed to receive only frequencies in the amateur bands.
- Hamfest** — A flea-market for ham radio, electronic and computer equipment and accessories.
- Half-wave dipole** — A popular antenna that is $\frac{1}{2}$ -wavelength long at the desired operating frequency. Dipoles usually consist of a single length of wire or tubing with a feed point at the center. See *dipole*.
- Harmful interference** — Interference that seriously degrades, obstructs or repeatedly interrupts a radio communication service operating in accordance with the Radio Regulations. [Part 97.3 (a) (22)]
- Harmonic** — A signal that is an integer multiple ($2\times$, $3\times$, $4\times$, etc) of a *fundamental* frequency.
- Hand-held radio** — A VHF or UHF transceiver that can be carried in the hand or pocket. Also known as an **HT**.
- Header** — The first part of a digital message containing routing and control information about the message. See *preamble*.

Headphones — A pair of speakers held against or inserted into each ear. A **headset** or **boomset** combines headphones with a microphone for additional convenience.

Health and Welfare traffic — Messages about the well-being of individuals in a disaster area. Such messages must wait for **Emergency** and **Priority traffic** to clear, and results in advisories to those outside the disaster area awaiting news from family and friends.

Henry (H) — The basic unit of *inductance*.

Hertz (Hz) — The basic unit of frequency. 1 Hz = 1 cycle per second.

High frequency (HF) — The term used for the frequency range from 3 MHz to 30 MHz.

High-pass filter (HPF) — A filter designed to pass signals above a specified *cutoff frequency*, while attenuating lower-frequency signals.

High-speed Multimedia (HSMM) — see *Broadband Hamnet*.

Hop — See *sky-wave propagation*.

ICS (Incident Command System) — method of organizing a response to emergencies and disasters used in the United States. (see also *National Incident Management System*)

Impedance — The ratio of ac voltage to ac current, including *phase*. The combination of *reactance* and *resistance* that constitutes opposition to *ac current*. Impedance is measured in *ohms*.

Impedance match — To adjust *impedances* to be equal or the case in which two impedances are equal. Usually refers to the point at which a feed line is connected to an antenna or to transmitting equipment. If the impedances are different, that is a **mismatch**. See *matched*.

Impedance matching network — A device that transforms one impedance to another, such as an antenna system input *impedance* to match that of a transmitter or receiver. Also called an *antenna-matching network* or **transmatch**.

Indicator — (1) A device used to signal status audibly or visually. (2) Characters added before or after a call sign signifying a change in license class or that the station or operator is transmitting away from the registered location.

Inductance — A measure of the ability to store energy in a *magnetic field*. Inductance is measured in *henries*.

Inductor — An electrical *component* that stores energy in a *magnetic field*. An inductor is usually composed of a coil of wire wound around a central core.

Input frequency — A *repeater's* receiving frequency.

Insulator — A material in which *electrons* do not move easily in response to an applied *voltage*. Insulation is used to prevent *current* flow between points at different voltages.

Integrated circuit (IC or chip) — An electronic *component* made up of many individual components in a single package.

Intermediate frequency (IF) — The stages in a *superheterodyne* receiver that follow a *mixer* circuit and that operate at a fixed frequency. Most of the receiver's *gain* and *selectivity* are achieved in the IF stages.

Intermodulation (intermod or IMD) — Spurious signals created by the combination of other signals. Usually related to the overload of circuits by strong signals.

International Amateur Radio Union (IARU) — The international organization of national Amateur Radio societies.

International Telecommunication Union (ITU) — The organization of the United Nations responsible for coordinating international telecommunications agreements.

Internet Radio Linking Project (IRLP) — A system of linking repeaters by using the Voice-Over-Internet Protocol.

Inverted V — A *dipole* antenna supported in the middle with each half sloping downward.

Inverter — A circuit that converts dc power into ac power.

Ion — An electrically-charged atom or molecule.

Ionosphere — A region of electrically charged (ionized) gases high in the atmosphere that affects the *propagation* of radio waves through it. See *sky-wave propagation*.

Isotropic antenna — An *antenna* that radiates and receives equally in all directions, both vertical and horizontal.

Jack (receptacle) — A *connector* designed to have a mating assembly inserted into it, usually mounted on a piece of equipment.

Keplerian elements — Numeric parameters describing a satellite's orbit that can be used to compute the position of the satellite at any point in time.

Kerchunk — The sound made when a brief transmission activates a repeater.

Key — A manually operated switch that turns a transmitter on and off to send *Morse code*.

Key click — Spurious signals generated as a transmitter is turned on and off that are heard as clicks by stations on nearby frequencies.

Keyboard-to-keyboard — A *digital mode* intended for operators to exchange text messages as the characters are entered.

Keyer or electronic keyer — A device that makes it easier to send well-formed Morse code. It sends a continuous string of either dots or dashes, depending on which lever of a connected *paddle* is pressed.

Kilo (k) — The metric prefix for 10^3 or multiplication by 1000.

Knife-edge — See *diffraction*.

Ladder line — See *open-wire line*.

Lag — In comparing two *waveforms*, refers to the waveform in which positive change occurs last.

Lead — (pronounced “*lead*”) (1) Refers to the wires or connection points on an electrical *component* or the probes and cables that are used to connect test instruments to the devices being measured. (2) In comparing two *waveforms*, refers to the waveform in which change in the positive direction occurs first.

Light-emitting diode (LED) — A *diode* that emits light when current flows through it.

Lightning protection — Methods to prevent lightning damage to your equipment (and your house), such as unplugging equipment, disconnecting antenna *feed lines* and using a **lightning arrester**.

Line-of-sight propagation — The term used to describe VHF and UHF *propagation* within the radio horizon in a straight line directly from one station to another.

Linear — (1) To act on a signal such that the result is a replica of the original signal at a different scale. (2) Equipment that amplifies the output of a transmitter, often to the full legal amateur power limit of 1500 W *peak envelope power (PEP)*.

Liquid-crystal display (LCD) — A device for displaying graphics or characters by passing light through a liquid crystal between patterns of *electrodes*.

Local control — Operation of a station with a *control operator* physically present at the transmitter.

Load — A device or system to which electrical *power* is delivered, such as a heating element or *antenna*. Also the amount of power consumed or that can be safely dissipated, such as a “50-watt load.”

Loading — (1) Attaching or increasing an electrical load. (2) Increasing an antenna’s apparent electrical length by inserting inductance or capacitance.

Lobe — A direction of maximum reception or transmission in an antenna’s *radiation pattern*. The **main lobe** has the greatest strength for the entire pattern. A **side lobe** is a maximum located at an angle to the main lobe.

Log — The documents of a station that detail operation of the station. They can be used as supporting evidence and for troubleshooting interference-related problems or complaints.

Log periodic — a type of frequency independent antenna

Loop — (1) An antenna with *element(s)* constructed as continuous lengths of wire or tubing. (2) A point of maximum voltage or current on an antenna.

Low Frequency (LF) — 30 to 300 kHz. A reference to the 2200 meter band.

Lower sideband (LSB) — (1) In an *AM* or *single sideband* signal, the *sideband* located below the *carrier* frequency. (2) The common single sideband operating mode on the 40, 80 and 160 meter amateur bands.

Lowest usable frequency (LUF) — The lowest frequency that can be used for communication using *sky-wave propagation* along a specific path.

Low-pass filter (LPF) — A filter designed to pass signals below a specified *cutoff frequency*, while attenuating higher-frequency signals.

Machine — Slang for *repeater*.

Magnetic field — A region of space in which magnetic energy is stored and in which a moving electrically charged object will feel a force.

Matched — A transmission or feed line that is terminated by a load that has the same *impedance* as the feed line’s *characteristic impedance*.

Maximum usable frequency (MUF) — The highest frequency that can be used for communication via *sky-wave propagation* along a specific path.

Maximum permissible exposure (MPE) — The maximum intensity of RF radiation to which a human being may safely be exposed. FCC Rules establish maximum permissible exposure values for humans to RF radiation. [Part 1.1310 and Part 97.13 (c)]

MAYDAY — From the French *m’aidez* (help me), MAYDAY is used when calling for emergency assistance in voice modes.

Medium Frequency (MF) — 300 kHz to 3 MHz. A reference to the 630 meter or 160 meter bands.

Mega (M) — The metric prefix for 10^6 or multiplication by 1,000,000.

Memory channel — Frequency and mode information stored by a radio and referenced by a number or alphanumeric designator.

Meteor scatter — Communication by signals reflected by the ionized meteor trails in the upper atmosphere.

Meter (instrument) — A device that displays a numeric value as a number or as the position of an indicator on a numeric scale.

Metric prefixes — A series of terms used in the *metric system* of measurement.

Metric system — A system of measurement that uses a set of prefixes to indicate multiples of 10 of a basic unit.

Medium frequency (MF) — The term used for the frequency range from 300 kHz to 3 MHz.

Micro (μ) — The metric prefix for 10^{-6} or division by 1,000,000.

Microphone (mic or mike) — A device that converts sound waves into electrical energy.

Microwave — The conventional term for frequencies greater than 1000 MHz (1 GHz).

Milli (m) — The metric prefix for 10^{-3} or division by 1000.

Mixer — (1) A circuit that combines two RF signals and generates **products** at both the signal's sum and difference frequencies. (2) An **audio mixer** adds multiple signals together into a single signal.

Mobile station — Any station that can be operated while in motion, typically in a car, but also on a boat, a motorcycle or bicycle, truck or RV.

Mobile flutter — Rapid amplitude variation of a signal from a moving vehicle experiencing *multipath interference*. Also called **picket fencing**.

Mode — (1) The combination of a type of information and a method of transmission. For example, FM radiotelephony or *FM phone* consists of using FM modulation to carry voice information. (2) The combination of a satellite's *uplink* and *downlink* bands.

Mode-restricted — Portions of the amateur bands in which only certain *emission types* are allowed.

Modem — Short for **modulator/demodulator**. A modem changes data into audio signals that can be transmitted by radio and *demodulates* a received signal to recover transmitted data.

Modulate — The process of adding information to an RF signal or *carrier* by varying its *amplitude, frequency, or phase*.

Moonbounce — see *Earth-Moon-Earth*.

Morse code — The system of encoding characters as dots and dashes invented by Samuel Morse. See *continuous wave*.

MUF — See *maximum usable frequency*.

Multiband antenna — An antenna capable of operating on more than one amateur band, usually using a single *transmission line*.

Multi-hop— Long-distance radio *propagation* using several skips or hops between the Earth and the *ionosphere*. See *sky-wave propagation*.

Multimeter — An electronic test instrument used to measure *current*, *voltage* and *resistance*. Alternate names are **volt-ohm-milliammeter (VOM)** and **vacuum-tube voltmeter (VTVM)**. If the numeric display is digital, the instrument may also be called a **digital multimeter (DMM)** or **digital voltmeter (DVM)**.

Multimode radio — Transceiver capable of SSB, CW and FM operation.

Multipath propagation — *Propagation* by means of multiple reflections. When the reflected signals partially cancel, it is referred to as **multipath interference**.

Multiple Protocol Controller (MPC) — A piece of equipment that can act as a *modem* or *TNC* for several *protocols*.

N or type N connector — A type of *RF connector* that can be used through *microwave* frequencies.

N-type — See *doping*.

Nano (n) — The metric prefix for 10^{-9} or division by 1,000,000,000.

National Electrical Code (NEC) — A set of guidelines governing electrical safety, including antennas.

National Incident Management System (NIMS) — The method by which emergency situations are managed by US public safety agencies.

Net — A formal system of operation in order to exchange or manage information.

Net control station (NCS) — The station in charge of a *net*.

Network — (1) A term used to describe several digital stations linked together to relay data over long distances. (2) A general term for electrical circuits.

Node — (1) One station in a digital network. (2) A point of minimum voltage or current on an *antenna*.

Noise blanker — A circuit or function that mutes the receiver output during noise pulses.

Noise reduction — Removing random noise from a receiver's audio output.

Notch filter — A *filter* that removes a very narrow range of frequencies, usually from a receiver's audio output audio. Also known as a *band-stop filter*.

Null — (1) Tune or adjust for a minimum response (2) A direction of minimum reception or transmission in an antenna's *radiation pattern*.

Offset frequency — The difference between a *repeater's* transmitter and receiver frequencies. Also known as the repeater's **split** or **offset**.

Ohm — The basic unit of electrical *resistance* and represented by the symbol Ω .

Ohm's Law — A basic electrical law stating that the *current* (I) through a *circuit* is directly proportional to the *voltage* (E) across the circuit and inversely proportional to the *resistance* (R) of the circuit: $I = E / R$. Ohm's Law is equivalently stated as $E = I \times R$ or $R = E / I$.

Ohmmeter — A device used to measure *resistance*.

Omnidirectional — An *antenna* that radiates and receives equally in all horizontal directions.

One-way communications — Radio signals not directed to a specific station, or for which no reply is expected. The FCC Rules provide for limited types of one-way communications on the amateur bands. [Part 97.111 (b)]

Open circuit — A break in an electrical *circuit* that prevents *current* from flowing.

Open repeater — A *repeater* available for use by all hams.

Open-wire line — A *transmission line* made from two parallel wires separated by insulation. Also known as **ladder line**, **parallel-conductor feed line**, **twin-lead**, or **window line**.

Operator/primary station license — An amateur license actually consists of two licenses. The **operator license** is that portion of an Amateur Radio license that gives permission to operate an *amateur station*. The **primary station license** is that portion of an Amateur Radio license that authorizes an *amateur station* at a specific location. The station license also lists the *call sign* of that station.

OSCAR — Orbiting Satellite Carrying Amateur Radio

Oscillate — To vibrate continuously at a single *frequency*. An **oscillator** is a device or circuit that generates a signal at a single frequency.

Output frequency — A *repeater's* transmitting frequency.

P-type — See *doping*.

Packet radio — A system of digital communication using the AX.25 protocol whereby information is broken into data groups called **packets** that also contain addressing and error-detection information.

Paddle — A pair of contacts operated by one or two levers used to control an electronic *keyer* that generates *Morse code* automatically.

Panadapter — Similar to the display of a spectrum analyzer, a panadapter centers the operating frequency in the middle of the display with signals on adjacent frequencies to the left and right.

Parallel circuit — An electrical *circuit* in which *current* may follow more than one path.

Parallel-conductor line — See *open-wire line*.

Parasitic element — An antenna *element* that affects the antenna performance by receiving and re-radiating energy from a *driven element* without being connected directly to the feed line.

Parity — An error detection method for *digital data* that counts the number of 1 bits in each data character. One bit added to each character — the parity bit — is used to indicate whether the correct number of 1 bits is odd or even.

Part 15 — The section of the FCC's rules that deal with unlicensed devices likely to transmit or receive RF signals.

Part 97 — The section of the FCC's rules that regulate Amateur Radio.

Passive filter — See *filter*.

Peak envelope power (PEP) — The average *power* during one RF cycle of a radio signal at the crest of the modulated *waveform*

Pecuniary — Payment of any type, whether money or other goods or services.

Perigee — The point in a satellite's orbit at which it is closest to the Earth. See *apogee*.

Period — The time it takes for one complete cycle of a repeating *waveform*. The reciprocal of *frequency*.

Phase — A measure of position in time within a repeating *waveform*, such as a *sine wave*. Phase is measured in *degrees* or *radians*.

Phase modulation (PM) — The process of adding information to a signal by varying its *phase*. Phase modulation is very similar to FM. PM signals can be received by FM receivers.

Phase-shift keying (PSK) — A method of digital *modulation* that shifts the transmitted signal's *phase* to represent the bits of digital data.

Phone — Another name for voice communications. An abbreviation for *radiotelephone*.

Phone emission — The FCC's name for voice transmissions.

Phone patch — Conducting a telephone call via radio communications.

Phonetic alphabet — A standardized list of words used on voice modes to make it easier to understand letters of the alphabet, such as those in call signs. The call sign KA6LMN stated phonetically is *Kilo Alfa Six Lima Mike November*.

Pico (p) — The metric prefix for 10^{-12} or division by 1,000,000,000,000.

PL (see CTCSS) — An abbreviation for Private Line, a trademark of Motorola.

Plug — An electrical *connector* designed to be inserted into a *jack* or *receptacle*.

PN junction — The interface between *N-type* and *P-type* material.

Polarity — The orientation or direction of a *voltage* or *current* with respect to a convention that assigns positive and negative.

Polarization — The orientation of the *electric field* of a *radio wave*. A radio wave can be horizontally, vertically, or circularly polarized.

Pole — In a *switch*, refers to a controlled *current* path or *circuit*.

Portable designator — Additional identifying information added to a *call sign* specifying the station's location.

Portable device — Generally considered to be a radio transmitting device designed to be transported easily and set up for operation independently of normal infrastructure. For purposes of RF exposure regulations, a portable device is one designed to have a transmitting antenna that is generally within 20 centimeters of a human body.

Potential — see *voltage*.

Potentiometer — (pronounced *po-ten-chee-AH-me-ter*) Another name for a variable *resistor* in which the resistance value can be changed without removing it from a circuit. Also called a **pot**.

Power — The rate of energy consumption or expenditure. To calculate power in an electrical *circuit* multiply the *voltage* applied to the circuit by the *current* through the circuit ($P = I \times E$).

Power amplifier — See *linear*.

Power density — The strength of a *radio wave* measured as power per unit of area.

Power supply — A device that converts ac power from a utility or other service to ac or dc power used by equipment.

Preamble — The information at the beginning of a *radiogram* that contains routing and other information about the message. See *header*.

Preamplifier — An amplifier used to increase the strength of a received signal. Preamplifier circuits are often included in a receiver and may be turned on or off.

Prefix — The leading letters and numbers of a call sign that indicate the country in which the *call sign* was assigned.

Primary service — When a frequency band is shared among two or more different radio services, the primary service is preferred. Stations in a **secondary service** must not cause harmful interference to, and must accept interference from stations in the primary service. [Part 97.303]

Primary station license — See *operator/primary station license*.

Priority traffic — Emergency-related messages, but not as important as *emergency traffic*.

Privileges — The frequencies and modes of communication that are permitted in an FCC telecommunications service

Procedural signals (prosign) — For *Morse code* communications, one or two letters sent as a single character, such as \overline{AR} or \overline{SK} , to indicate the operator's intention or to control the communication. For *phone* communications, prosigns consist of single words, such as "Break" or "Over."

Propagation — The method by which *radio waves* travel.

Protocol — A method of *encoding*, packaging, and exchanging digital data.

Push to talk (PTT) — Turning a transmitter on and off manually with a switch, usually thumb- or foot-activated.

Q signals — Three-letter symbols beginning with Q used in *Morse code* to save time and to improve communication. Some examples are QRS (send slower) and QTH (location).

Q system — A method of providing signal quality reports on a scale of 1 ("Q1") to 5 ("Q5").

QSL card — A postcard that serves as a confirmation of communication between two hams. QSL is a *Q-signal* meaning "received and understood."

QSO — A conversation between two radio amateurs. QSO is a *Q signal* meaning "I am in contact."

Quad antenna — A *directional antenna* with *elements* in the shape of four-sided loops, one *wavelength* in circumference.

Quarter-wave vertical — A *ground-plane* antenna constructed of a $\frac{1}{4}$ -wavelength radiating *element*, usually oriented perpendicularly to the Earth or ground-plane.

Question pool — The set of questions from which an amateur license exam is constructed. There is one pool for each license class.

Radial — A wire forming part of a *ground plane*, attached at an antenna's base and running radially away from the antenna.

Radian — A measure of angle or *phase*. Each radian equals $360/2\pi$ or 57.3 degrees.

Radiation — To emit or give off energy, such as a radio wave. **Ionizing radiation** has sufficient energy to cause an electron to escape from an atom, creating a charged *ion*. RF energy used for radio communication is much less energetic and is called **non-ionizing radiation**.

Radiation pattern — A graph showing how an *antenna* radiates and receives in different directions. An **azimuthal pattern** shows radiation in horizontal directions. An **elevation pattern** shows radiation at different vertical angles.

Radio Amateur Civil Emergency Service (RACES) — A part of the Amateur Service that provides radio communications for civil defense organizations during local, regional or national civil emergencies.

Radio direction finding (RDF) — The method of locating a transmitter by determining the bearings of received signals.

Radio frequency (RF) exposure — FCC Rules establish *maximum permissible exposure* (MPE) values for humans to RF radiation. [Part 1.1310 and Part 97.13 (c)]

Radio frequency (RF) signals — RF or **radio signals** are generally considered to be any electrical signals with a frequency higher than 20,000 Hz, up to 300 GHz.

Radio-frequency interference (RFI) — Disturbance to electronic equipment or to radio communication caused by radio-frequency signals.

Radiogram — A formal message exchanged via radio.

Radio horizon — The most distant point on the Earth to which radio signals can travel without *ionospheric* or *tropospheric propagation*. See *sky-wave propagation*.

Radioteletype (RTTY) — A *data mode* that used the Baudot code to encode characters.

Radio wave — An *electromagnetic wave* with a frequency greater than 20 kHz.

Ragchew — An informal conversation.

Range — The distance over which radio signals are exchanged.

Reactance — The property of opposition to ac current. Capacitors exhibit **capacitive reactance** and inductors exhibit **inductive reactance**. Reactance is measured in *ohms*.

Receiver (RVCR) — A device that converts radio waves into signals we can hear, see, or be read by a computer.

Receiver overload — Interference to a receiver caused by a RF signal too strong for the receiver input circuits. A signal that overloads the receiver RF input causes *front-end overload*. Receiver overload is sometimes called **RF overload**.

Receiver incremental tuning (RIT) — A transceiver control to adjust the receive frequency without affecting the transmit frequency. See also *transmitter incremental tuning*.

Receiving converter — A device that shifts the frequency of incoming signals so that a receiver can be used on another band.

Recharge — See *charge*.

Reciprocal operating authority — Permission for amateur radio operators from another country to operate in the US using their home license. This permission is based on various treaties between the US government and the governments of other countries.

Rectifier — A diode intended for use in *power supplies* and power conversion circuits.

Rectify — Convert *ac* to *dc*.

Reflected power — Power in a *transmission line* returning to the transmitter from the load or antenna.

Reflector — (1) A parasitic element of a *Yagi antenna* that cancels the radiated signal in the undesired direction. (2) A conducting surface that acts as an electrical mirror to reflect radio waves.

Refract — Bending of an *electromagnetic wave* as it travels through materials with different properties. Radio waves are refracted as they travel through the *ionosphere*.

Region — Administrative areas defined by the *International Telecommunication Union (ITU)*.

- Regulation** — The ability of a *power supply* to control output voltage.
- Relay** — A *switch* operated by an electromagnet.
- Remote control** — Operation of a station in which the control functions of the station are operated by a *control operator* over a *control link*.
- Remote receiver** — A receiver at a separate location from a transmitter. Used by *repeater* systems to extend listening range or by individual stations to improve reception capabilities.
- Repeater** — A station that retransmits the signals of other stations to give them greater range.
- Resistance** — The property of opposing an electric *current*. Resistance is measured in *ohms*.
- Resistor** — An electronic *component* with a specific value of *resistance*, used to oppose or control current through a *circuit*. Resistors can be either fixed or variable. (See *potentiometer*.)
- Resonance** — The condition in an electrical circuit or antenna in which *reactance* is zero.
- Resonant circuit** — A circuit that exhibits *resonance* at one or more frequencies.
- Resonant frequency** — The frequency at which a circuit or antenna is resonant. See *tuned circuit*.
- RF burn** — A burn produced by contact with high RF voltages.
- RF choke** — An *inductor* or other impedance used to prevent or reduce the flow of RF current.
- RF connector** — A type of electrical *connector* designed specifically for use with RF signals.
- RF feedback** — Distortion of transmitted speech caused by RF signals being picked up by the microphone input circuits.
- RF ground** — The technique of maintaining the enclosures of radio equipment at a common RF voltage. See *bonding*.
- RF overload** — See *receiver overload*.
- RF safety** — Preventing injury or illness to humans from the effects of radio-frequency energy.
- Rig** — The radio amateur's term for a transmitter, receiver or transceiver.
- Round-table** — A contact in which several stations take turns transmitting.
- RST** — A system of numbers used for signal reports: R is readability, S is strength and T is tone. (On phone, only R and S reports are used.)
- Rubber duck antenna** — A flexible rubber-coated antenna used mainly with handheld VHF or UHF transceivers.
- S meter** — A meter that provides an indication of the relative strength of received signals in **S-units**.
- Safety interlock** — A switch that automatically turns off power to a piece of equipment when the enclosure is opened.
- Safety ground** — A *ground* connection intended to prevent shock hazards.
- Scanning** — Rapidly switching between frequencies to listen for an active *channel*.

Tone scanning determines what CTCSS access tones are present in specific signal.

Scattering — Radio wave *propagation* by means of multiple reflections in the layers of the atmosphere or from an obstruction.

Schematic diagram — A drawing that describes the electrical connections in a piece of electric or electronic equipment by using symbols to represent the electrical *components*.

Schematic symbol — A standardized symbol used to represent an electrical or electronic *component* on a *schematic diagram*.

SDR (Software Defined Radio) — Radio in which signal processing functions are performed by software that can be reconfigured automatically or under operator control.

Secondary service — See *primary service*.

Selectivity — The ability of a receiver to distinguish between signals.

Semiconductor — (1) A material with conductivity between that of a *conductor* and an *insulator*. (2) An electrical *component* constructed from semiconductor material.

Sensitivity — The ability of a receiver to detect signals.

Series circuit — An electrical *circuit* in which there is only one path for the *current* to follow.

Service — A set of regulations by the FCC that defines a certain type of telecommunications activity.

Shack — The room or location in which an *amateur station* is constructed.

Shield — (1) A cable's metallic layer or coating intended to prevent external signals from being picked up by an internal conductor or to prevent signals from being radiated from the internal conductor. (2) A metal wall or case that blocks RF signals.

Shielding — Surrounding an electronic circuit with conductive material to block RF signals from being radiated or received.

Short circuit — An electrical connection that causes *current* to bypass the intended path. Short-circuit often refers to an accidental connection that results in improper operation of equipment or circuits.

Sideband — An RF signal that results from modulating the amplitude or frequency of a *carrier*. An AM sideband can be either higher in frequency (**upper sideband** or **USB**) or lower in frequency (**lower sideband** or **LSB**) than the carrier. FM sidebands are produced on both sides of the carrier frequency.

Signal generator — A device that produces a low-level signal that can be set to a desired frequency.

Signal report — An evaluation of the transmitting station's signal and reception quality. See *Q system* and *RST*.

Simplex — Receiving and transmitting on the same frequency. See *duplex* and *half-duplex*.

Sine wave — A *waveform* with an amplitude equal to the sine of frequency × time.

Single sideband (SSB) — SSB is a form of *amplitude modulation* in which one *sideband* and the *carrier* are removed.

Skip — See *sky-wave propagation*.

Skip zone — An area of poor radio communication, too distant for *ground-wave*

propagation and too close for *sky-wave propagation*.

Skyhook — Slang for antenna.

Sky-wave propagation — The method of *propagation* by which radio waves travel through the *ionosphere* and back to Earth. Also referred to as *skip*. Travel from the Earth's surface to the ionosphere and back is called a *hop*.

Slow-scan television (SSTV) — A television system used by amateurs to transmit pictures within the *bandwidth* required for a voice signal.

SMA — A type of RF connector used at *microwave* frequencies.

Software Defined Radio — see *SDR*.

SOS — A *Morse code* call for emergency assistance.

Source — See *transistor*.

Space station — An *amateur station* located more than 50 km above the Earth's surface.

Speaker — A device that turns an *audio frequency* electrical signal into sound.

Specific absorption rate (SAR) — A term that describes the rate at which RF energy is absorbed by the human body. *Maximum permissible exposure (MPE)* limits are based on whole-body SAR values.

Spectrum — The range of electromagnetic signals. The radio spectrum includes signals between audio frequencies and infrared light.

Speech compression or processing — Increasing the average *power* of a voice signal by amplifying low-level *components* of the signal more than high-level *components*.

Splatter — A type of interference to stations on nearby frequencies that occurs when a transmitter is *overmodulated*.

Sporadic E (Es or E-skip) — A form of *propagation* that occurs when radio signals are reflected from small, densely ionized regions in the *E region* of the *ionosphere*. Sporadic E has been observed from the 15 meter through 1.25 meter bands.

Spurious emissions — Signals from a transmitter on frequencies other than the operating frequency.

Squelch — Circuitry that mutes the audio output of a receiver when no signal is received. **Carrier squelch** operates only on the presence of a signal carrier. **Tone squelch** requires a specific *CTCSS* tone to be present before allowing receiver audio to be heard. **Digital Code Squelch (DCS)** requires a continuous sequence of tones.

Squelch tail — The burst of noise heard from an FM receiver between when a station stops transmitting and when the receiver's *squelch* circuit mutes the receiver.

Stage — One of several circuits or devices that act on a signal in sequence.

Standard offset — The standard transmitter/receiver frequency offset used by a *repeater* on a particular *amateur band*. For example, the standard offset on 2 meters is 600 kHz. Also see *offset frequency*.

Standing-wave ratio (SWR) — A measure of the impedance match between the transmission line's *characteristic impedance* and that of the *load* (usually an *antenna* or *antenna system*). **VSWR** is the ratio of maximum voltage to minimum voltage along the transmission line formed by the standing waves that result from power being reflected by the antenna or load. SWR is also the ratio of feed point impedance or load impedance to the feed line's *characteristic impedance*.

Station license — See *operator/primary station license*.

Stratosphere — The part of the Earth's *atmosphere* between the troposphere and ionosphere, extending from about 7 miles to 30 miles above the Earth.

Sub-audible tone — See *CTCSS*.

Suffix — The letters that follow a *call sign* prefix identifying a specific amateur.

Sunspot cycle — The number of sunspots increases and decreases in a predictable cycle that lasts about 11 years.

Sunspots — Dark spots on the surface of the Sun where magnetic fields create regions of cooler (darker) temperatures.

Superheterodyne — A type of receiver that shifts signals to a fixed *intermediate frequency (IF)* for *amplification* and *demodulation*. Each frequency shift is termed a **conversion** and the superheterodyne is described as being a single-, double-, or triple-conversion.

Surge protector — A device that is used to prevent temporary or *transient* excessive voltages from damaging sensitive electronic equipment.

Switch — A *component* used by an operator to connect or disconnect electrical *circuits*.

SWR meter — A measuring instrument that can indicate when an antenna system is working well. A device used to measure SWR. See *standing wave ratio*.

Tactical call signs — Names used to identify a station's location or function during emergency communications.

Tactical communications — Communications to coordinate actions or logistics during an emergency, disaster, or public service operation.

Telecommand — A one-way radio transmission to start, change or end functions of a device at a distance.

Telemetry — Information about a device sent to a receiving station by radio.

Television interference (TVI) — Disruption of television reception caused by another signal.

Temporary state of communications emergency — When a disaster disrupts normal communications in a particular area, the FCC can declare this type of emergency. Certain rules may apply for the duration of the emergency.

Terminal Node Controller (TNC) — A device that acts as an interface between a computer and a radio for implementing a *data mode*.

Termination — A load or antenna connected to a *transmission line*.

Third-party — An unlicensed person on whose behalf communications is passed by amateur radio.

Third-party communications — Messages passed from one amateur to another on behalf of a third person.

Third-party communications agreement — An official agreement between the United States and another country that allows amateurs in both countries to participate in third-party communications.

Third-party participation — An unlicensed person participating in amateur communications. A *control operator* must ensure compliance with FCC rules.

Throw — In a *switch*, refers to the number of alternative *current* paths for a controlled *circuit*.

Ticket — Slang for an Amateur Radio license.

- Time-out timer** — A device that limits the amount of time a *repeater* can transmit without a pause by the input signal.
- Tolerance** — The allowed variation in the dimensions or value of an electrical or mechanical *component*, usually expressed in percent or as a range of values.
- Track** — To follow a satellite as it travels around the Earth. **Tracking software** uses the satellite's *Keplerian elements* to determine its location and when it is visible from a specific location.
- Traffic** — Formal messages exchanged via radio. *Traffic handling* is the process of exchanging traffic. A *traffic net* is a net specially created and managed to handle traffic.
- Transformer** — An electrical *component* that transfers ac power from one circuit to another by means of a magnetic field shared by two or more *inductors*.
- Transient** — A short pulse of electrical energy.
- Transceiver (XCVR)** — A radio transmitter and receiver combined in one unit.
- Transistor** — A *semiconductor* device used as a *switch* or *amplifier*. A **bipolar junction transistor (BJT)** is made from a pair of back-to-back *PN junctions*, and is controlled by a *current*. A BJT has three *electrodes*: **base**, **collector**, and **emitter**. A **field-effect transistor (FET)** uses an *electric field* to control *current* flow through a conducting *channel*. An FET has three electrodes: **gate**, **drain**, and **source**.
- Transmatch** — see *impedance matching network*.
- Transmission line** — Cable used to connect a transmitter, receiver or transceiver to an *antenna* or *load*.
- Transmit-receive (TR) switch** — A circuit or device that switches an *antenna* between *transmitter* and *receiver* circuits or equipment.
- Transmitter (XMTR)** — A device that produces radio frequency signals with sufficient power to be useful for communications.
- Transmitter Incremental Tuning (XIT)** — A transceiver control to adjust the transmit frequency without affecting the receive frequency. Also see *receiver incremental tuning*.
- Transponder** — A device usually used on satellites that retransmit all signals in a range of frequencies.
- Transverter** — A device that converts signals so that a transceiver can operate on another band.
- Trip** — Activate when a threshold is exceeded or an event is detected. A *circuit breaker* trips, opening a circuit, when excessive *current* flow occurs, for example.
- Troposphere** — The region in Earth's atmosphere between the Earth's surface and the *stratosphere*.
- Tropospheric bending** — When radio waves are bent or *refracted* in the *troposphere*, they return to Earth farther away than the visible horizon.
- Tropospheric ducting** — A type of VHF propagation that can occur when warm air overruns cold air (a **temperature inversion**).
- Tropospheric propagation (tropo)** — Any method of propagation by means of atmospheric phenomena in the *troposphere*.
- Tuned circuit** — A circuit with a *resonant frequency* that can be adjusted, usually

through the use of adjustable *capacitors* or *inductors*.

Tuning — Adjusting a radio or *circuit* that is frequency-sensitive.

Twin-lead — See *open-wire line*.

UHF connector — A type of *RF connector* usually used below 500 MHz.

Ultra high frequency (UHF) — The term used for the frequency range from 300 MHz to 3000 MHz (3 GHz).

Ultraviolet (UV) — *Electromagnetic waves* with frequencies greater than visible light. Literally, “above violet,” which is the high-frequency end of the visible range.

Unbalanced line — *Transmission line* with one conductor connected to *ground*, such as *coaxial cable*.

Uncontrolled environment — Any area in which an RF signal may cause radiation exposure to people who may not be aware of the radiated electric and magnetic fields. The FCC generally considers members of the general public and an amateur’s neighbors to be in an uncontrolled RF radiation exposure environment to determine the *maximum permissible exposure* levels. See *controlled environment*.

Unidentified communications or signals — Signals or radio communications in which the transmitting station’s *call sign* is not transmitted.

Unintentional radiator — A device that radiates RF signals not required for its normal operation.

Universal Licensing System (ULS) — FCC database for all FCC radio services and licensees.

Uplink — Transmitted signals or the range of frequencies for transmissions from Earth to a satellite. See *downlink*.

Upper sideband (USB) — (1) In an AM signal, the *sideband* located above the carrier frequency. (2) The common single-sideband operating mode on the 60, 20, 17, 15, 12 and 10 meter HF amateur bands, and all the VHF and UHF bands.

Vacuum tube — An electronic *component* that operates by controlling *electron* flow between two or more *electrodes* in a vacuum.

Vanity call — A *call sign* selected by the amateur instead of one sequentially assigned by the FCC.

Variable-frequency oscillator (VFO) — An *oscillator* with an adjustable frequency. A VFO is used in receivers and transmitters to control the operating frequency.

Vertical antenna — An antenna with a single vertical radiating *element*. See *ground-plane antenna*.

Very high frequency (VHF) — The term used for the frequency range from 30 MHz to 300 MHz.

Visible horizon — The most distant point one can see visually.

Voice mode (communications) — Any of the several methods used by amateurs to transmit speech that is listened to as it is received. Voice modes include analog modes such as FM and SSB as well as digital modes such as D-STAR and DMR.

Voice Over Internet Protocol (VOIP) — A method of sending voice and other audio over the Internet as digital data.

Volt (V) — The basic unit of electric potential or *electromotive force*.

Voltage — A measure of *electric potential* between two points.

- Voltmeter** — A test instrument used to measure *voltage*.
- Volunteer Examiner (VE)** — A licensed amateur who is accredited by a Volunteer Examiner Coordinator (VEC) to administer amateur license examinations.
- Volunteer Examiner Coordinator (VEC)** — An organization that has entered into an agreement with the FCC to coordinate amateur license examinations.
- Voice-Operated Transmission (VOX)** — Turning a transmitter on and off under control of the operator's voice.
- Waterfall display** — Used with digital modes, this type of display consists of a sequence of horizontal lines showing signal strength as a change of brightness with frequency represented by position on the line. Older lines move down the display so that the history of the signal's strength and frequency form a "waterfall-like" picture.
- Watt (W)** — The unit of *power* in the metric system.
- Wattmeter** — Also called a *power meter*, a test instrument used to measure the power output (in watts) of a transmitter. A **directional wattmeter** can measure power flowing in either direction in a feed line.
- Waveform** — The amplitude of an ac signal over time.
- Wavelength** — The distance a *radio wave* travels during one *cycle*. The wavelength relates to frequency in that higher frequency waves have shorter wavelengths. Represented by the symbol λ .
- Weak-signal** — (1) Refers to the use of SSB, digital, or CW on the VHF and UHF bands because they provide better communications at low signal levels than FM signals. (2) Any mode of operation that involves very low signal levels, such as *Earth-Moon-Earth*.
- Whip antenna** — An antenna with an *element* made of a single, flexible rod or tube.
- Willful interference** — Intentional, deliberate obstruction of radio communications.
- Window line** — See *open-wire line*.
- Winlink** — A system of email transmission and distribution using Amateur Radio for the connection between individual amateurs and mailbox stations known as **Radio Message Servers (RMS)**.
- WSJT** — A suite of software programs for *weak signal* and *scatter mode* communications.
- WWV/WWVH** — Radio stations run by the National Institute of Standards and Technology (NIST) to provide accurate time and frequencies.
- XCVR** — Transceiver
- XIT** — see *transmitter incremental tuning*.
- XMTR** — Transmitter
- Yagi antenna** — The most popular type of *directional antenna* or *beam*. It has one *driven element* and one or more *parasitic elements*.