

Chapter 1

Getting Acquainted with Ham Radio

In This Chapter

- ▶ Becoming a part of ham radio
 - ▶ Traversing the world of ham radio
 - ▶ Making a contact with ham radio
 - ▶ Constructing a ham radio shack
-

Ham radio invokes a wide range of visions. Maybe you have a mental image of a ham radio operator (or *ham*) from a movie or newspaper article. But hams are a varied lot — from go-getter emergency communicators to casual chatters to workshop tinkerers. Everyone has a place, and you do, too.

Hams use all sorts of radios and antennas on a wide variety of frequencies to communicate with other hams across town and around the world. They use ham radio for personal enjoyment, for keeping in touch with friends and family, for emergency communications, and for experimenting with radios and radio equipment. They communicate using microphones, telegraph or Morse keys, computers, cameras, lasers, and even their own satellites.

Hams meet on the air and in person. Ham radio clubs and organizations are devoted to every conceivable purpose. They have special ham radio flea markets and host conventions, large and small. Hams as young as six years old and centenarians have been hams since before ham radio licenses. Some have a technical background, but most do not. One thing all these diverse individuals do have, however, is an interest in radio that can express itself in many different ways.

Ham: Not just for sandwiches anymore

Everyone wants to know the meaning of the word “ham,” but as with many slang words, the origin is murky. Theories abound, of course, ranging from the initials of an early radio club’s operators to the use of a meat tin as a natural sound amplifier. Out of the many possibilities, this theory condensed from the American Radio Relay League’s (ARRL) Web site seems the most believable:

“*Ham*: a poor operator” was used in telegraphy even before radio. The first wireless operators were landline telegraphers who brought with them their language and much of the tradition

of their older profession. Government stations, ships, coastal stations, and the increasingly numerous amateur operators all competed for signal supremacy in each other’s receivers. Many of the amateur stations were very powerful and could effectively jam all the other operators in the area. When this logjam happened, frustrated commercial operators would send the message “THOSE HAMS ARE JAMMING YOU.” Amateurs, possibly unfamiliar with the real meaning of the term, picked it up and wore it with pride. As the years advanced, the original meaning has completely disappeared.

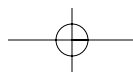
Tuning In Ham Radio Today

Hams enjoy three different aspects of ham radio — the technology, operating, and social points of view. Your interest in the hobby may be technical; you may want to use ham radio for a specific purpose; or you may just want to join the fun. All are perfectly valid reasons for getting a ham radio license.

Using electronics and technology

Ham radio is full of electronics and technology (see Chapter 2). To start with, transmitting and receiving radio signals is a very electronics-intensive endeavor. After you open the hood on ham radio, you’re exposed to everything from basic direct-current electronics to cutting-edge radio-frequency techniques. Everything from analog electronics to the very latest in digital signal processing and computing is available in ham radio. I’ve been in the hobby for more than 30 years and I’ve never met anyone who is an expert on it all.

You may choose to design and build your own equipment or assemble a station from factory-built components, just like an audiophile might do. All that you need for either path is widely available in stores and on the Web. Hams delight in a do-it-yourself ethic known as *homebrewing* and help each other out to build and maintain their stations.



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Hams also develop their own software and use the Internet along with radios to create novel hybrid systems. Hams developed packet radio by adapting data transmission protocols used over computer networks to amateur radio links. Packet radio is now widely used in many commercial applications. By combining GPS radiolocation technology with the Web and amateur mobile radios, the Automatic Position Reporting System (APRS) was developed and is now widely used. More information about these neat systems is contained in Parts III and IV.

Voice and Morse code communications are still the most popular technologies by which hams talk to each other, but computer-based digital operation is gaining fast. The most common home station configuration today is a hybrid of the computer and radio. Some of the newer radios are exploring software-defined radio (SDR) technology that allows reconfiguration of the circuitry that processes radio signals under software control.

Along with the equipment and computers, hams are students of antennas and *propagation*, which is the means by which radio signals bounce around from place to place. Hams take an interest in solar cycles, sunspots, and how they affect the Earth's ionosphere. For hams, weather takes on a whole new importance, generating static or fronts along which radio signals can sometimes travel long distances. Antennas, with which signals are launched to take advantage of all this propagation, provide a fertile universe for the station builder and experimenter.

Antenna experimentation is a hotbed of activity for hams. New designs are created every day and hams have contributed many advances and refinements to the antenna designer's art. Antenna systems range from small patches of printed circuit board material to multiple towers festooned with large rotating arrays. All you need is some wire, a feedline, and a soldering iron.

Hams also use radio technology in support of hobbies such as radio control (R/C), model rocketry, and meteorology. Hams have special frequencies for R/C operation in the 6-meter band, away from the crowded unlicensed R/C frequencies. Miniature ham radio video transmitters are frequently flown in model aircraft, rockets, and balloons, beaming back pictures from heights of hundreds and thousands of feet. Ham radio data links are also used in support of astronomy, aviation, auto racing and rallies, and many other pastimes.

Whatever part of electronic and computing technology you most enjoy, it's all used in ham radio somewhere . . . and sometimes all at once!

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Operating a ham radio: Making contacts

If you were to tune a radio across the ham bands, what would you hear hams doing? Contacts run the range from simple conversation to on-the-air meetings to contesting (recording the highest number of contacts).

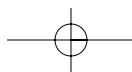
Ragchews

By far the most common type of activity for hams is just engaging in conversation, which is called *chewing the rag*; such contacts are called *ragchews*. Ragchews take place between continents or across town. You don't have to know another ham to have a great ragchew — ham radio is a very friendly hobby with little class snobbery or distinctions. Just make contact and start talking! Find out more about ragchews in Chapter 9.

Nets

Nets (an abbreviation for networks) are organized on-the-air meetings scheduled for hams with a similar interest or purpose. Some of the nets you can find are

- ✔ **Traffic nets:** These are part of the North American system that moves text messages or *traffic* via ham radio. Operators meet to exchange or *relay* messages, sometimes handling dozens in a day. Messages range from the mundane to emergency health-and-welfare.
- ✔ **Emergency service nets:** Most of the time, these nets just meet for training and practice. When disasters or other emergencies strike, hams organize around these nets and provide crucial communications into and out of the stricken areas until normal links are restored.
- ✔ **Technical Service:** These nets are like radio call-in programs in which stations call with specific questions or problems. The net control station may help, but more frequently, one of the listening stations contributes the answer. Many are designed specifically to assist new hams.
- ✔ **ALE Mailboxes and Bulletin Boards:** If you could listen to Internet systems make contact and exchange data, this is what they'd sound like. Instead of transmitting 1s and 0s as voltages on wires, hams use tones. *ALE* stands for *Automatic Link Establishment* and means that a computer system is monitoring a frequency all the time so that others can connect to it and send or retrieve messages. Sailors and other travelers use ham radio where the Internet isn't available.
- ✔ **Swap Nets:** In between the in-person hamfests and flea markets, in many areas a weekly swap net allows hams to list items for sale or things they need. A net control station moderates the process and business is generally conducted over the phone once the parties have been put in contact with each other.



It's better than "masticating the towel"

Unlike "ham," the origins of "ragchew" are fairly clear. The phrase "chewing the rag" is well known back to the late Middle Ages. "Chew" was slang for "talk," and "rag" is derived from "fat," or is a reference to the tongue. "Chewing the rag" thus became a phrase referring to

conversation, frequently while sitting around a meal. Hams picked up that usage from telegraphers, and because most of ham radio is, in fact, conversations, it has been a part of radio from its earliest days.

***D**X-ing, contests, and awards*

D X stands for *distance* and the lure of making contacts ever-farther from home has always been a part of ham radio. Hams compete to contact faraway stations and to log contacts with every country. They enjoy contacting islands and making personal friends in a foreign country. When conditions are right and the band is full of foreign accents, succumbing to the lure of D X is easy!

Ham radio's version of rugby, contests are events in which the point is to make as many contacts as possible, sometimes thousands, during the contest time period, by sending and receiving short messages. These exchanges are related to the purpose of the contest — to contact a specific area, use a certain band, find a special station, or just contact everybody.

Along with contests, thousands of special-event stations and awards are available for various operating accomplishments, such as contacting different countries or states. For example, in December 2003, the station W4B was set up at Kitty Hawk, North Carolina, and operated during the centennial of the Wright Brothers' first flight.

D X -ing, contests, and awards are closely related, and if you enjoy the thrill of the chase, go to Chapter 11 to find out more about all of these activities.

***J**oining the ham radio community*

Because of their numbers and reliance on uncomplicated infrastructure, hams are able to bounce back quickly when a natural disaster or other emergency makes communications over normal channels impossible. Hams organize themselves into local and regional teams that practice responding to a variety of emergency needs, working to support public safety agencies such as police and fire departments.

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Is it hurricane season? Every fall in North America, ham emergency teams gear up for these potentially devastating storms. Hams staff an amateur station at the National Hurricane Center in Florida (www.fiu.edu/orgs/w4ehw/) and keep the Hurricane Watch Net busy on 14.325 MHz (www.hwn.org/). After the storm, hams are the first voices heard from the affected areas with many more standing by to relay their messages and information.

After the September 11, 2001, terrorist attacks, hams manned an emergency operations center around the clock for weeks. Government agencies had to focus on coordinating recovery and rescue efforts. The hams were able to handle “health-and-welfare” messages to support the emergency workers in their efforts.

Every June, on the last full weekend, hams across the United States engage in an emergency operations exercise called *Field Day*. It’s an opportunity for hams to operate under emergency conditions. An amateur emergency team or station probably is operating in your town or county.

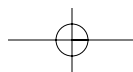
Hams provide assistance for more than emergencies. Wherever there is a parade, festival, marathon, or other opportunity to provide communications services, you may find ham radio operators helping out. In fact, this is great training for emergencies!



A particularly beneficial relationship exists between ham radio and *philately*, or stamp collecting. Hams routinely exchange postcards called *QSLs* with their call signs, information about their stations, and often colorful graphics or photos. Stamp collecting hams combine the exchange of *QSLs* with collecting by sending the cards around the world with local colorful stamps or special postmarks. Foreign hams return the favor with a stamp of their own. The cheerful greeting of those red-and-blue airmail envelopes from an exotic location is a special treat!

Hams like to meet in person as well as on the radio. Membership in at least one radio club is a part of nearly every ham’s life. In fact, in some countries, you’re required to be a member of a club before you can even get a license. Chapter 3 shows you how to find and join clubs — they’re great sources of information and assistance for new hams.

The two other popular ham gatherings are *hamfests* and conventions. A *hamfest* is a ham radio flea market where hams bring their electronic treasures for sale or trade. Some are small, parking-lot-size get-togethers on a Saturday morning while others attract thousands of hams from all over the world and last for days. These are more like the conventions hams hold with a variety of themes from public service to DX and low-power operating. Hams travel all over the world to attend conventions and meet friends known only as a voice and a call sign over the crackling radio waves.



Roaming the World of Ham Radio

Although the United States has a large population of hams, it by no means represents the majority. The amateur population in Europe is growing by leaps and bounds, and Japan has an even larger amateur population. With more than 3 million hams worldwide, very few countries are without an amateur.

Hams are required to have a license, no matter where they operate. The international agency that manages radio activity is the International Telecommunication Union, or ITU (www.itu.int/home/). Each member country is required to have its own government agency that controls licensing inside its borders. In the United States, hams are part of the Amateur Radio Service, which is regulated and licensed by the Federal Communications Commission (FCC). Outside the United States, Amateur Radio is governed by similar rules and regulations.

Amateur Radio licenses in America are granted by the FCC, but the tests are administered by other hams acting as *volunteer examiners*, or VEs. I discuss VEs in detail in Chapter 4. Classes and testing programs are often available through local clubs.

Since the adoption of international licensing regulations, hams operate from many different countries with a minimum of paperwork. For example, a ham from a country that is a party to the international license recognition agreement known as CEPT can use his or her home license to operate from within any other CEPT country. The ARRL has gathered a lot of useful material about international operating on its Web site at www.arrl.org/FandES/field/regulations/io.

Hams across the world

Where are the hams and how many are around this big world? Over 3 million populate the amateur bands, although not all are equally active. As of 2000, the International Amateur Radio Union (IARU) counted 195 different countries with a national radio society. The growing countries of the Pacific Rim have substantial amateur populations. Europe, Africa, and Russia

total 442,193. The Americas total nearly 1 million with 830,492. Asia and the Pacific countries have the most at 1,714,087. Amateur numbers are showing moderate growth in North America and strong growth in Asia and Europe. Tune the bands on a busy weekend and you'll see what I mean!

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Because radio signals know no boundaries, hams have always been in touch across the political borders. Even during the Cold War, U.S. and Soviet hams made regular contact, fostering long personal friendships and international goodwill. While the Internet makes global communications easy, chatting by voice or Morse code over the airwaves to someone in another country is exciting.

Communicating with Ham Radio

Though you make contacts for different purposes — chatting, emergencies, a net, or to win a contest — most contacts follow the same structure.

After you get a response from your call or respond to someone else calling, you exchange names, information about who you are, and the quality of your signal to gauge conditions. If you're chatting, you can talk about how you constructed your station, what you do for a living, your family, and your job.

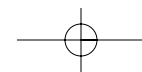
Except for the fact that you take turns transmitting and information is converted to radio waves that bounce off the upper atmosphere, contacts are just like talking to someone that you meet at a party or convention. You can hold the same conversation by voice, using Morse code, or typing from keyboard to keyboard using computers as intermediaries to the radios. You won't find great purpose behind the average contact except a desire to meet another ham and see where your radio signal can be heard.



A frequent question asked about ham radio is, "How do you know where to tune for a certain station?" and the answer is usually, "You don't!" Ham radio operators don't have specific frequency assignments or use channel numbers. The good news is that ham radio has an unparalleled flexibility to make and maintain communications under continually changing circumstances. The bad news is that making contact with one specific station is hard because you may not know on what frequency to call them. However, hams have found many ways around the latter problem with the result being an extraordinarily powerful and adaptive communications service.

Building a Ham Radio Shack

The term *radio shack*, for me, conjures visions more worthy of a mad scientist's lab than a modern ham station. But your radio shack is simply the place you keep your radio and ham equipment. The days of bulbous vacuum tubes, jumping meters, and two-handed control knobs are in the distant past.



Shacks that aren't Lakers

Where did the phrase, radio shack, come from? Back in the early days of radio, the equipment was highly experimental and all home-built, requiring a nearby workshop. In addition, the first transmitters used a noisy spark to generate radio waves. The voltages were high and the equipment somewhat of a mess, so the radio

hobbyists often found themselves banished from the house proper. Thus, many early stations were built in a garage or tool shed. The term "shack" was only natural and carries through today as a description of the state of order and cleanliness found in many a ham's lair.

For some hams, the entire shack consists of a hand-held radio or two. Other hams operate on the go in a vehicle. Cars make perfectly good shacks, but most hams have a spot somewhere at home they claim for a ham radio. Here's what you can find in a ham shack:

- ✔ **The rig:** The offspring of the separate receiver and transmitter of yore, the modern radio or *rig* combines both in a single, compact package about the size of a large DVD player. Like its ancestors, a large tuning knob controls the frequency. Unlike them, state-of-the-art digital displays replace the dials and meters.
- ✔ **Computer:** A majority of hams today have at least one computer in the shack. Computers now control many radio functions (including keeping records). Using digital data communications simply wouldn't be possible without one. Some hams use more than one computer at a time.
- ✔ **Mobile/base rig:** For operating on the local repeater stations, hams may use a hand-held radio, but in the shack a more capable radio is used. These units are about the size of a good-sized hardcover book and you can use them as either a mobile or base rig.
- ✔ **Microphones, keys, and headphones:** Depending on the shack owner's preferences, you see a couple (or more!) of these important gadgets, the radio's true user interface. Mikes and keys range from imposing and chrome-plated to miniaturized and hidden. The old Bakelite headphones or *cans* are also a distant memory (good — they hurt my ears!), replaced with lightweight and comfortable, hi-fi quality designs.
- ✔ **Antennas:** In the shack, you find switches and controllers for antennas that live outside the shack. Outside, a ham shack tends to sprout antennas ranging from vertical whips the size of a pencil to wire antennas stretched through the trees and on up to super-sized directional beams held high in the air on steel towers. See Chapter 12 for more info on antennas.

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✓ **Cables and feedlines:** Look behind, around, or under any piece of shack equipment and you find wires. Lots of them. The radio signals pipe through fat, black round cables called *coaxial* (coax). You're probably familiar with audio cables from stereo equipment. Power is supplied by colored wires not terribly different in size from house wiring. I cover cables and feedlines in more detail in Chapter 12.

Although you perform many of the same functions as the hams from the nineteenth century, the modern shack is as far removed from the home-brewed breadboards in the backyard shed as a late model sedan is from a Model T. You can see examples of several different shacks, including mine, in Chapter 13.