

# What is Amateur Radio?

## 1

**P**eople who pursue the hobby of using a personal radio station to communicate, purely for non-commercial purposes, with other radio hobbyists call it *ham radio* or *Amateur Radio*. They call themselves Amateur Radio operators, ham radio operators or just plain “hams.”

You already know a little about the hobby—hams communicate with other hams, around the block, on a distant continent—or from an orbiting space station! Some talk via computers, others prefer to use regular voice communications and still others enjoy using one of the oldest forms of radio communication—Morse code. Some hams help save people’s lives by handling emergency communications following a natural disaster or other emergency. Some become close friends with the people they talk to on the other side of the globe—then make it a point to meet one or more of them in person. Some can take a bag full of electrical parts and turn it into a station accessory that improves their station’s reception of distant radio signals.

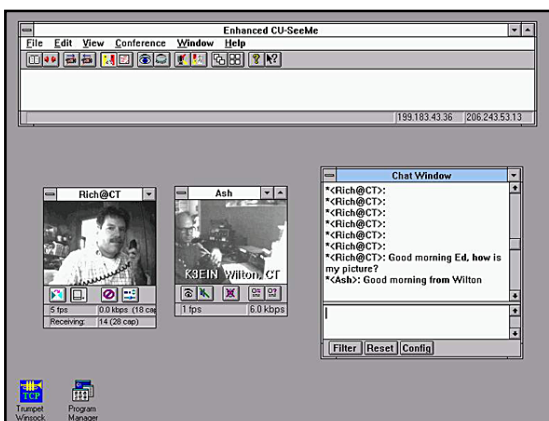
This chapter, by Rosalie White, K1STO, covers the basics—what hams do, and how they do it.

### HOBBY OF DIVERSITIES

You can’t imagine all of the unusual, interesting things you can do as an Amateur Radio operator. What types of people will you meet as a ham? If you



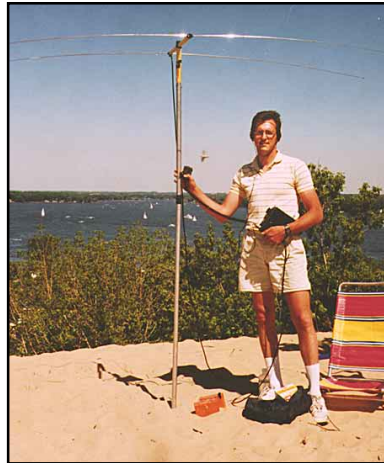
**Hams are always willing to help others who are excited about becoming ham radio operators. You'll find more information in this chapter about how to locate ham radio operators in your local area.**



**Computers are an integral part of ham radio, and the Internet plays a large role. Rich Roznoy, K1OF and Ed Ashway, K3EIN, use their PCs to hold a video conference. Audio transmission was by way of their VHF transmitters. (Photo courtesy of Rich Roznoy, K1OF)**



**Back to the past. Al Brogdon, W1AB, operates a reconstruction of pioneer station W1BCG on the 75th anniversary of the first two-way short-wave message across the Atlantic. (Photo courtesy of Paul Danzer, N1II)**



**Ham radio, sun and fun. Peter Venlet, N8YEL, enjoys hilltop operating. Lightweight, portable rigs and small batteries give you many opportunities to pick your operating spot.**

walk down a city street, you'll pass men and women, girls and boys, and people of all ages, ethnic backgrounds and physical abilities. They're office workers and students, nurses and mail carriers, engineers and truck drivers, housewives and bankers. Any of them might be a ham you will meet tonight on your radio.

If you drive your car on the interstate this weekend, you'll see people on their way to a state park, a Scout camp, a convention, an airport or a computer show. The young couple going to the park to hike for the day have their hand-held ham radio transceivers in their backpacks.

When they stop on a scenic hill-

top for a rest, they'll pull out their radios and see how far away they can communicate with the radio's 3 watts of power. And, the radios will be handy just in case they break down on the road or lose the hiking trail.

The father and son on their way to Scout camp will soon be canoeing with their Scout troop. After setting up camp, they'll get out a portable radio, throw a wire antenna over a branch, and get on the air. Aside from the enjoyment of talking with other hams from their campsite, their radios give them the security of having reliable communications with the outside world, in case of emergency.

The family driving to the ham radio convention will spend the day talking with their ham friends, including two they've never met but know quite well from talking to them on the air every week. They will also look at new and used radio equipment, listen to a speaker talk about the latest ways computers can be used to operate on the Amateur Radio bands, and enjoy a banquet talk by a NASA astronaut who is also a ham radio operator.

The couple on the way to the airport to take a pleasure flight in their small plane have packed their hand-held radios in their flight bags. Once they're airborne, they'll contact hams on the ground all along their flight path. Up at 5,000 feet, they can receive and transmit over much greater distances than they can from the ground. Those they contact will enjoy the novelty of talking to hams in a plane. The radios are an ideal means of backup communications, too.

The two friends on their way to the computer show are discussing the best interface to use between their computers and their radios for a mode of operating called packet radio. They're looking forward to seeing a number of their ham friends who are also into computers.



**A ham's operating area is called *the shack*. It may be a corner of a room, a basement area or in this case part of a former battleship. The Mobile (AL) Amateur Radio Club installed a temporary station, W4IAX, on this imposing structure.**

## All Types of Physical Abilities

People who don't get around as much as they'd like to, find the world of Amateur Radio a rewarding place to make friends — around the block or around the globe. Many hams with and without certain physical abilities belong to the HANDI-HAM System, an international organization of radio amateurs who bring ham radio to all individuals. HANDI-HAM members live in every state and many countries around the world, and are ready to help in whatever manner they can. The HANDI-HAM System provides study materials and aids for persons with physical disabilities. Local HANDI-HAMs will assist you with studies at home. Once you receive your license, the [Courage HANDI-HAM System](#) may lend you basic radio equipment to get you started on the air.

What other exciting things can you look forward to on the ham bands? You might catch yourself excitedly calling (along with 50 other hams) a Russian cosmonaut in space or a sailor on the Coast Guard's tall ship *Eagle*. You could be linked via packet radio with an Alaskan sled-dog driver, a rock star, a US legislator, a major league baseball player, a ham operating the Amateur Radio station aboard the ocean liner *Queen Mary*, an active-duty soldier, a king—or someone who is building the same power supply that you are from a design in this *ARRL Handbook*.

On the other hand, a relaxing evening at home could find you in a friendly radio conversation with a ham in Frankfort, Kentucky, or Frankfurt, Germany. Unlike any other hobby, Amateur Radio knows no country boundaries and brings the world together as good friends.

Although talking with astronauts isn't exactly an everyday ham radio occurrence, more and more hams are doing just that, as many NASA astronauts are ham radio operators.

## THE TECHNICIAN LICENSE: THE SHORTEST PATH TO AMATEUR RADIO FUN!

When you're ready to start, the Technician license presents an excellent way for beginners to start enjoying the fun and excitement of Amateur Radio. The only requirement for this license is that you pass a single 35-question written exam. The exam covers FCC rules and regulations that govern the airways, courteous operating procedures and techniques, and some basic electronics. There is no Morse code requirement for a Technician license.

Technician frequency privileges begin at 50 MHz and extend through the very high frequency (VHF) and ultra high frequency (UHF) ranges, and into the microwave region. All these frequency bands give Technicians plenty of room to explore. They aren't restricted to only certain operating modes, either. They can use any communications methods allowed to hams.

Most new hams will operate first on the popular 2-meter band. With plenty of *repeaters* across the country, the FM voice signals from their low-power hand-held and mobile radios reach many other hams. Technicians also communicate through *satellites* and *packet radio* networks. They use *single-sideband (SSB)* voice and *Morse code (CW)*.

Technician licensees can gain operating privileges on the amateur high frequency (HF) bands by passing a 5-wpm Morse code test. Passing another 35-question written exam completes the upgrade to a General class license. Generals enjoy worldwide communications using SSB and CW as well as *slow-scan television (SSTV)* and a variety of *digital communications* modes.

One more written exam, this one containing 50 questions, will take you to the top of the Amateur Radio license ladder—the Amateur Extra class license. Amateur Extra class licensees enjoy full amateur privileges on all bands. The exam may be challenging, but many hams find it to be well worth the effort!

## WHAT'S IN A CALL SIGN?

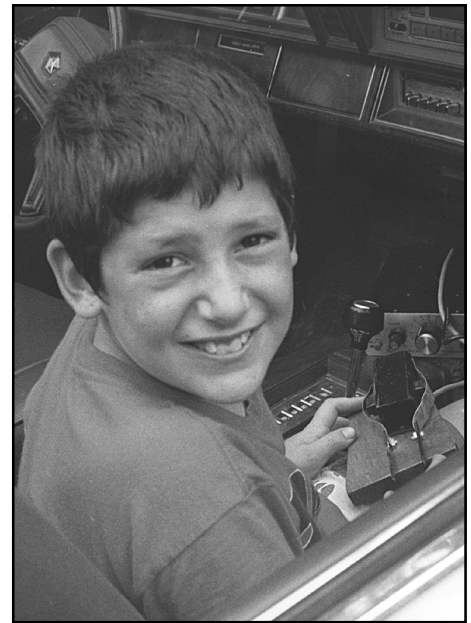
When you earn your Amateur Radio license, you receive a unique *call sign*. Many hams are known by their call signs (and not necessarily by their names!). All US hams get a call sign, a set of letters and numbers,



assigned to them by the Federal Communications Commission (FCC). No one else “owns” your call sign—it’s unique. Your Amateur Radio license with your unique call sign gives you permission to operate your Amateur Radio station on the air. US call signs begin with W, K, N or A, with some combination of letters and numbers that follow. In addition, the number in the middle of the call sign indicates the location within the country. In the US, for example, call signs that have a 9 in them indicate that the ham lived in the Midwest when the license was issued, and call signs with the number 1 indicate New England. You can tell what country issued a ham’s call sign by the *prefix*—the letters before the number.



**You can never tell what you get into. The Redondo Beach (CA) Amateur Radio Club wanted to put one end of an antenna near the top of this 100-foot high tree. No one volunteered to climb, so the local fire department was talked into taking part in the antenna raising party.**



**Danny, KD4HQV, likes to operate using Morse code (CW). Here he is using a homemade set of code paddles, while his father drives. (Photo courtesy of AC4HF)**

## HAM RADIO ACTION

Amateur Radio and public service go together. On a warm early-summer weekend, hams can be found directing radio communications in the aftermath of a train derailment—a simulated one, that is—to help prepare for a real emergency. Others provide radio communications for a walk-a-thon. Still others hone their communications skills by setting up a station outdoors, away from electrical power. This largest public-service-related ham activity is called *Field Day*.

## Biking and Cruising

Hams even operate their radios while riding on bicycle treks. They easily carry their lightweight handheld radios in their packs, and can pull them out quickly, if needed. Or if they’re really serious they pull along a small trailer with a sleeping bag, food and water supplies and a ham radio transceiver that they can set up in the evenings.

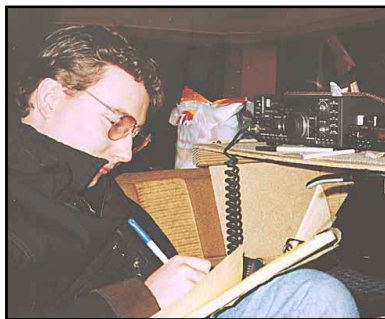
Ham radio manufacturers have begun offering hams adventures on ships that sail in the picturesque Caribbean. They set up radio stations for you to operate at various exotic ports on these expeditions. You get to operate the radios, relax luxuriously on the open seas, meet new friends from all over the globe and see new places. Although not all trips to exotic locales to operate ham radio stations, which hams call *DXpeditions*, are this glamorous, many hams enjoy activating a rare country to provide contacts for their fellow hams around the world.

## Nets: Scheduled Get-Togethers

If you’d like to find other hams with vocational or avocational interests like yours (such as chess, gardening, rock climbing, railroads, computer programming or teaching), you’ll soon learn about *nets*.

## Field Day: Ham Radio Alfresco

If you know any hams, they've probably talked about Field Day. On the fourth full weekend each June, amateurs from all over the US and Canada, and in other parts of the world as well, take their equipment into the great outdoors to operate away from power mains. The idea is to practice setting up and operating under emergency conditions. Participants set up efficient temporary stations and contact as many other Field Day stations as possible. Although it is a practice effort for future serious situations, Field Day is, above all, fun; you can't help but enjoy the challenge of working cooperatively with your group to compete against perhaps 100,000 other hams who are also braving the elements to attain the same goal!



Many different arrangements are possible on Field Day—under the stars, in a tent or in the back of a camper, which is where Geof, KE4GVY, is operating. Notice the bag of chips at the left rear—standard nighttime nourishment.

A net forms when hams with similar interests get together on the air on a regular schedule. You can find your special interest—from the Armenian Amateur Radio and Traffic Net to the Zone 9 ARES Net—listed in *The ARRL Net Directory* published annually.

## Awards and Contests: Competitive Fun

If you're competitive by nature, you'll want to explore ham radio awards and contests. These activities recognize your ability to contact other hams under published guidelines. In the ARRL DX Contest, for example, you'll try to contact as many DX (foreign) stations as possible over a weekend. Experienced hams with top-notch stations easily contact more than 100 different countries during a single DX Contest weekend!

Awards you can earn include *Worked All States*, earned by communicating with a ham in every US state, *Worked All VE*, earned by contacting hams in every Canadian province and the *DX Century Club*, for working stations in 100 or more different countries.



The Sounds of  
Amateur Radio

Listen to EA3FJM working stations during the Phone weekend of the 1990 ARRL International DX Contest.

In an outdoor orienteering competition, “fox-hunters” (also called “bunny-hunters”) track and locate hidden transmitters by car or on foot. This activity also has its serious side: Skills learned in tracking the “fox” come in handy when there's a suspected pirate (unlicensed station) in the neighborhood.

## QRP: Talk to the World with 5 Watts of Power

For a real challenge, try operating *QRP* — using low-power. Some enjoy operating with only 1 watt, or even less. It's certainly a challenge, but with decent antennas and skillful operating, QRP enthusiasts can be heard around the world. One of the best reasons for operating QRP is that equip-



The gang's all here. Who said ham radio is a solo activity? Standing are KC9XT, N9LVL, KB9ATR, WZ9M, N9IOX and N9LBT. Seated are Chris Kratzer, W9XD and KB9GRP. (Photo courtesy of Mike McCauley, KB9GNU)

## Support for Expeditions

The first ham radio operator to cooperate in an expedition was League member Don Mix, 1TS. With his radio equipment in tow, he accompanied Donald B. MacMillan to the Arctic on the schooner *Bowdoin* in 1923. In subsequent years, hams assisted with perhaps 200 other voyages and expeditions.

In the fall of 1999, Amateur Radio was part of the Border-to-Border Expedition Society's trek. Participants retraced the routes of the hearty Stampeders who searched the Klondike Gold Fields in the 1890s. Ham radio operators and others journeyed across Alaska and the Northwest Territories in Land Rover vehicles; the hams kept daily radio schedules, sharing their real-time adventures with school students and other hams. Chief radio operator Jim Wilmerding, W2EMT, used the special events radio call sign K2A (Klondike to Alaska) just for this Trans-American trek.

ment is lightweight, inexpensive and easy to build. Some hams use nothing but “home-brew” equipment.

## Unusual Modes

If computers are your favorite aspect of today's technology, you'll soon discover that you can connect your computer and ham radio equipment and operate on such digital modes as *packet radio* and *PSK-31*. With packet, you can leave messages that other packet enthusiasts will pick up and answer later. One popular packet activity is the *DX PacketCluster*, which allows hams to get real-time information about where and when rare foreign stations can be found on the bands. Another is satellites: A series of packet radio satellites provides long-distance computer-based communications with low power. PSK-31 is a popular digital mode used on the amateur high-frequency (HF) bands.

Computers also can help you practice taking ham radio license examinations or improve your Morse code abilities. ARRL, and others, offer software especially designed to help you pass ham radio exams. As you become more experienced, you'll discover software for any number of ham radio applications, from keeping track of the stations you've contacted during a contest to designing the best antenna for your location. Hams also use software to download pictures transmitted by weather satellites.

## Enhancing Radio Signals

Radio signals normally travel in straight lines, which limits their range. But hams have found some ingenious ways of extending the distance and improving the quality of the signals they transmit. High-frequency (HF) radio waves can be refracted or bent by a layer of the atmosphere called the ionosphere. In this way, signals are returned to Earth, often after several “hops.” This *ionospheric propagation* of radio signals allows worldwide communication on the HF bands. Hams have also learned how to bounce signals off the moon, airplanes and even meteor trails! Repeaters, located on hilltops or on tall buildings, strengthen signals and transmit them much farther than would be possible without repeaters.

## Helping out in Emergencies

When commercial communications services are disrupted by power failures or damage that accompanies natural disasters such as earthquakes, floods and hurricanes, Amateur Radio operators are often first at the scene. Battery-powered equipment allows hams to provide essential communications even



**This is a fully equipped station. John, WA2WVR, likes to operate all modes—code, voice and digital data. His shack sports several Morse code keys, a boom microphone and a computer.**





**Hams get involved. A hiking accident in the Sierra Mountains of California led to a successful rescue effort through the efforts of KF6BEC, KE6YXE, KB6BSS, KD6ZOD and the local Sheriff's Department.**

## **Hams at the Forefront**

Over the years, the military and the electronics industry have often drawn on ham ingenuity to improve designs or solve problems. Hams provided the keystone for the development of modern military communications equipment, for example. In the 1950s, the Air Force needed to convert its long-range communications from Morse code to voice, and jet bombers had no room for skilled radio operators. At the time, hams communicated by voice at great distance with both home-built and commercial single-sideband (SSB) equipment. Air Force Generals LeMay and Griswold, both radio amateurs, hatched an experiment that used ham equipment at the Strategic Air Command headquarters in Omaha and an airplane traveling around the world. They found that the equipment would need only slight modification to meet Air Force needs. By applying ham radio technology to a military problem, the two generals saved the government millions of dollars in research and development costs.

when power is knocked out. If need be, hams can make and install antennas “on the spot” from whatever materials and supports they find available.

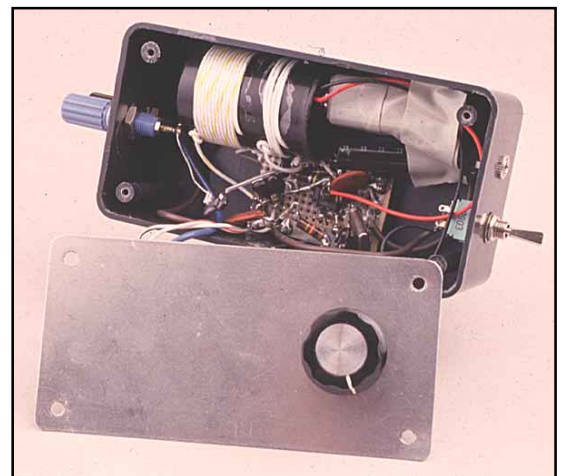
Working with emergency personnel such as police and fire departments, the Red Cross and medical personnel, ham volunteers provide any communications necessary. Hams can handle communications between agencies whose normal radios are incompatible with one another, for example. The ability of radio amateurs to help the public in emergencies is one of the reasons Amateur Radio has survived and prospered since the early days of the 20th century.

## **Community Events**

To keep their emergency-preparedness skills honed, and to help their community, hams enjoy assisting with communications to aid the public at any number of events and activities. Hams volunteer to provide communications for walk-a-thons, bike races, parades and other community events. In fact, it's rare to see a large community event that doesn't make use of public-spirited ham radio operators.

## **Build It Yourself**

Another favorite activity hams enjoy is building their own radio equipment. Hams proudly stay at the forefront of technology, continually being challenged to keep up with advances that could be applied to the hobby. Many have an incessant curiosity and an eagerness to try new techniques. They also are constantly driven to find ways to allow the radio frequency bands to support more users, since some portions of certain bands are very popular and can be crowded.



**The art of *homebrewing*, or building your own, is alive and well. This small receiver contains two transistors and one integrated circuit. It can be assembled without any special tools in one or two evenings. The thrill of listening to a station on a radio you built yourself lasts a lot longer than that! See [Chapter 17](#) for a selection of receivers and transceivers you can build yourself.**

The projects you'll find in this book provide a wide variety of equipment and accessories that make ham radio more convenient and enjoyable. Many manufacturers provide parts kits and etched circuit boards to make building even easier.

## Hams in Space

In 1983, the first ham/astro-naut made history by communicating with ground-based hams from the space shuttle *Columbia*. On that mission, Payload Specialist Owen Garriott, whose Amateur Radio call sign is W5LFL, took along a hand-held amateur transceiver and placed a specially designed antenna in an orbiter window. It was the first time ham radio operators throughout the world were to experience the thrill of working an astronaut aboard an orbiting spacecraft. In 1985, Mission Specialist Tony England, W0ORE, transmitted slow-scan television (SSTV) via Amateur Radio while orbiting the Earth from the shuttle *Challenger*. He named the payload *SAREX*, for Shuttle Amateur Radio *EX*periment. This name has since been changed to *Space Amateur Radio EX*periment because astronaut hams will be even more active from the International Space Station when it is in use.

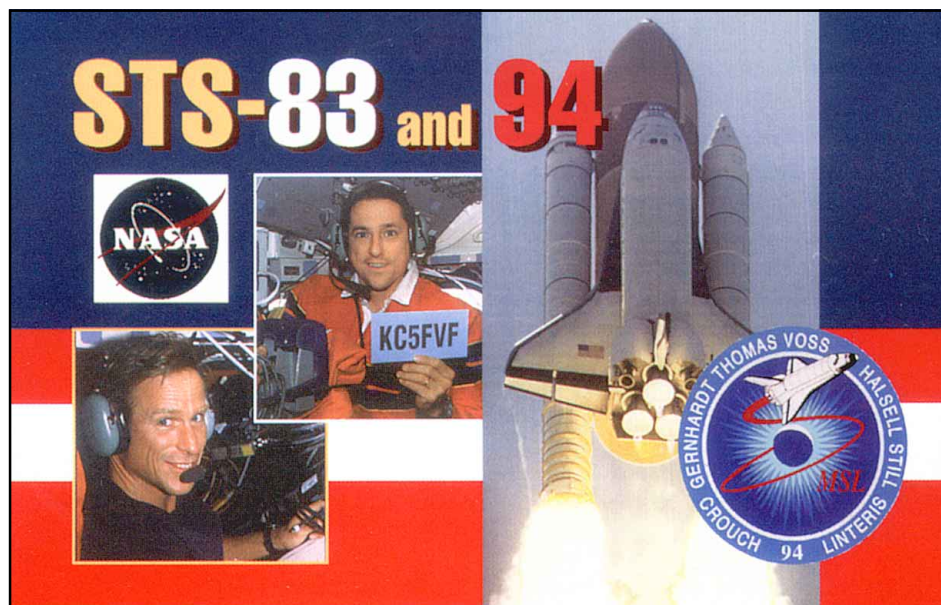
It wasn't long before NASA was routinely scheduling SAREX missions. In 1991, each of the five members of a shuttle crew had earned an Amateur Radio license. NASA promotes ham radio activity aboard shuttle spacecraft because of its proven public relations and educational value. It's also a reliable means of backup communication. During a recent year, five shuttle crews requested that NASA include a SAREX payload on their flights. As for the future, hams are making plans for a ham radio station aboard a manned space station.



Phyllisan West, KA4FZI, has been teaching her middle-school students all about ham radio for years. That's Matt Clark, KC4QXJ, on the straight key.



Most communication with space, both manned shuttles and unmanned satellites, uses VHF, UHF or microwave frequencies. This homebrewed antenna was designed to be used for a new satellite called *Phase 3D*.



If you had a radio contact with the crew of the space shuttle *Columbia*, mission STS-83 (renamed STS-94), you could have requested this picture QSL card. Crew-members included three ham operators: Commander Jim Halsell, KC5RNL; Mission Specialist Janice Voss, KC5BTK; and Mission Specialist Don Thomas, KC5FVF. Many astronauts are ham radio operators who look forward to talking with hams back on Earth. They will be even more interested in doing so once they become crewmembers with long-duration stints aboard the International Space Station.



## OSCARs: The Ham Satellites

You can experience the thrill of hearing your own signal returned from space by an orbiting “repeater in the sky” — a ham radio satellite. Or marvel at the clear pictures of the Earth you receive from the camera aboard another ham satellite. Hams regularly use Amateur Radio satellites, called OSCARs (for *Orbiting Satellites Carrying Amateur Radio*). VHF and UHF signals from a ham radio transceiver normally don’t travel much beyond the horizon. But if you route your signal through an orbiting satellite, you can make global radio contacts on VHF and UHF.

In 1990, a series of small Amateur Radio satellites, called Microsats, were launched. One, called WEBERSAT, transmits image data that you can process into pictures using your personal computer and special software. Another is a packet radio satellite that allows messages from Earth to be stored and forwarded back down to Earth when the spacecraft is within range of the designated station.

Hams are experimenting with low-orbit global communication satellites that can store their real-time radio messages for delivery at a later time. This would allow hams to communicate with other hams in developing countries that can’t afford expensive channels on geostationary satellites. Hams from around the globe are working together to design, build and launch an exciting new satellite that is the most ambitious amateur satellite project ever conceived. It will use the latest electronics technology to provide thousands of hams with reliable and pleasurable worldwide communications on several radio frequencies up through the microwave bands.

Does all of this sound futuristic or beyond your skills? It shouldn’t. All it takes is a Technician license to enjoy this exciting ham radio technology.



**The St Xavier High School Amateur Radio Club assembled for this photo just before a big weekend contest. Their enthusiastic efforts led them to a high score for their type of station.**

Plans have been under way for quite some time to have Amateur Radio on the International Space Station, in a program known as ARISS. While crew members are on board the spacecraft, they will have some leisure time. The ham astronauts will use some of that time to talk to hams, their families and school students. The space station requires long-duration stints in space, unlike space shuttle missions, so many astronauts have elected to earn their Amateur Radio licenses now.

## GETTING STARTED

Now that you have an idea of what hams do, you’re probably asking, “Okay, how do I get started?” The first step is to earn a license.

Most people start with the Technician license, which requires that you pass a 35-question written exam. The exams are given by local ham Volunteer Examiners (VEs). Many clubs sponsor exam sessions on a regular basis, so you shouldn’t have to travel far to take your exam. They are often given on weekends or evenings. The exam questions are taken from a large pool of questions for each license class. The complete question pools for each license class are published in study guides and can even be found on the Internet. (See the URL for *ARRLWeb* in the Resources section at the end of this chapter.)

### Study Guides

You can prepare for the exams on your own or in a class. Help is available at every step. The ARRL publishes complete study materials for all classes of Amateur Radio licenses. Contact ARRL’s New Ham Desk (the [address and phone number](#) are at the end of this chapter) for a free package of information. It contains everything you need to get started: a list of nearby Amateur Radio clubs, Amateur Radio instructors who have registered with ARRL, and local volunteer examiners. The package also includes

a description of the frequencies hams can use, and the most popular operating activities. It also has information about the latest versions of ARRL study guides.

ARRL's book for beginners, *Now You're Talking!*, includes the complete, up-to-date question pool with the correct answers, as well as clear explanations. You'll also find tips for how to choose your equipment and put together your ham radio station, how to build and install simple, inexpensive antennas and much more.

*Now You're Talking!* assumes no prior electronics background. Children as young as five years old have passed ham radio exams!

If you already have some electronics background or just want brief explanations to help you understand the correct answers, then *ARRL's Tech Q & A* may be just what you need for your Technician exam preparation. Every question in the Technician question pool is included, to help you prepare for that exam. When you are ready to upgrade to a higher class license, then *The ARRL General Class License Manual* and *The ARRL Extra Class License Manual* will guide your study efforts. ARRL's *Your Introduction to Morse Code* will teach you the Morse code and prepare you for the 5-wpm exam.

## Elmers

Many ham radio operators learn how to get on the air through the buddy system. An experienced ham, called an "Elmer," teaches one or more newcomers about Amateur Radio on a one-to-one basis. Elmering became a ham tradition many years ago. It was first documented in ARRL's monthly magazine, *QST*, in a story that was meant to be a public thank you from an appreciative student whose mentor's name was Elmer. Elmers are there for you as you study for your exam, buy your first radio and set up your station. Many watch with pride as their newly licensed friends make their first on-the-air contacts.

## Putting Together a Station

As with any other hobby, you can have fun with ham radio no matter how small (or large) your budget. You can start with a hand-held transceiver that fits in your pocket or purse, and take it along when you hike, canoe or aviate. Or you can fill your "radio shack" with the latest and fanciest radios technology offers and money can buy, and talk to people in all corners of the world. You can build a simple, inexpensive wire antenna to string between two trees in your backyard, or install giant towers, with arrays of phased beam antennas on top.

Accessories and equipment for your ham radio station come in all price ranges. *QST* contains display advertisements for new ham gear plus columns of classified ads for previously owned items. ARRL Field & Educational Services can provide you with information about where to find ham radio equipment.

## Used Versus New

Hams are continually upgrading their stations, so you can always find a ready supply of good previously owned Amateur Radio gear. You can find new hand-held transceivers and used HF radios for less



This is the ham radio equivalent of walking and chewing gum at the same time! Russell, KC5RWR, operates a *packet radio* station using the computer keyboard, while talking to another station on the hand-held radio. This station, KC5NTO, was operated by a group of Explorer Scouts.



Today's nonsmokers have made the ashtray superfluous. N1II took his out and mounted a small transceiver directly in the dashboard. This mobile station takes up no room in the passenger area. (Photo courtesy of Paul Danzer, N1II)

than \$300. Many hams start with a radio that costs between \$300 and \$600. Antennas and other gear can add appreciably to the cost, but less-expensive alternatives, such as putting together your own antenna or low-power transceiver, are available.

## HAMS AS WORLD CITIZENS

When you become an Amateur Radio operator, you become a “world citizen”—you join a group of people who have earned the privilege of talking to other hams around the corner or around the world. Hams have a long tradition of spreading international goodwill. One way hams do this is to assist with getting needed medical advice or medicine to developing countries. Another is by learning about the lives and cultures of those they contact. On the other hand, it’s a good idea to avoid sensitive political or ethical issues.

Although English is the standard language on the ham bands, English-speakers will make a good impression on hams in foreign countries if they can speak a few words of the other person’s language—even if it’s as simple as *danke* or *sayonara*.

## International Amateur Radio

Hams in other countries have formed national organizations, just as US hams organized the ARRL—the national association for Amateur Radio. These sister societies work together to have a united voice in international radio affairs, such as when governments get together to decide how radio frequencies will be divided among its various users. The International Amateur Radio Union (IARU), composed of about 150 national Amateur Radio societies, works to advance the cause of Amateur Radio at the international level. ARRL works closely with other IARU societies to help protect the amateur frequencies.

## THE ADMINISTRATORS: ITU AND FCC

The laws of physics allow for a limited spectrum of radio frequencies. These radio frequencies must be shared by many competing radio services: broadcasters, land mobile, aeronautical and marine, to name a few.

The International Telecommunication Union (ITU), an agency of the United Nations, allocates these frequencies among the many services that use them. With its long tradition of public service and technological savvy, ham radio enjoys the use of many different frequency bands.

In the US, a government agency, the FCC, regulates the radio services, including Amateur Radio. The section of the FCC Rules that deals with Amateur Radio is Part 97. Hams are expected to know the important sections of Part 97, as serious violations (such as causing malicious interference or operating without the appropriate license) can lead to fines and even imprisonment! Aside from writing and enforcing the rules governing Amateur Radio, the FCC also assigns call signs and issues licenses to those who have earned them.

## THE ARRL

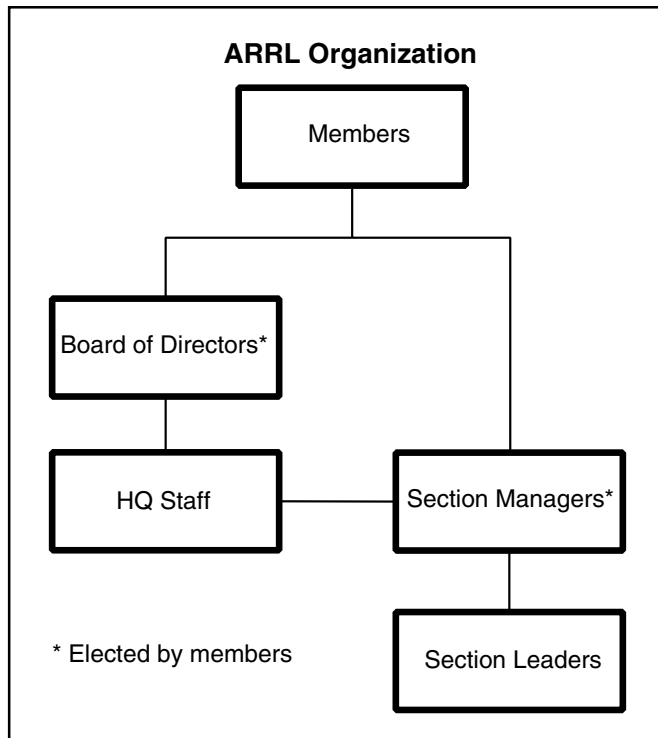
Since it was founded, in 1914, the ARRL has grown and evolved along with Amateur Radio. The ARRL Headquarters building and Maxim Memorial Station, W1AW, are in Newington, Connecticut, near Hartford. Through its network of dedicated volunteers and a professional staff, the ARRL promotes the advancement of the amateur service in the US and around the world.

The ARRL operates as a nonprofit, educational and scientific organization dedicated to the promotion and protection of the many privileges that ham radio operators enjoy today. Of, by and for the radio



**There were no computers, satellites or TV when Clarice, W7FTX, was first licensed in 1935. One thing has not changed—the friendship of her fellow hams.**





**Fig 1—Full members of the ARRL control the organization through an elected Board of Directors. Volunteers (all positions except for HQ staff) accomplish much of the work.**



**W1AW, the station operated by the ARRL in Newington, Connecticut, is known around the world as the home of ham radio. W1AW memorializes Hiram Percy Maxim, one of the founders of the ARRL. Visitors are welcome and you might even be able to operate. (Photo courtesy of W2ABE)**

amateur, ARRL numbers within its ranks the vast majority of active amateurs in North America. Around 170,000 licensed ham radio operators and unlicensed persons with an interest in ham radio are members. Licensed hams join as Full Members, while unlicensed persons become Associate Members who have all membership privileges except for voting in ARRL elections. Anyone who has an interest in Amateur Radio has a place in the ARRL.

The ARRL volunteer corps is called the Field Organization. Working at the state and local level, these volunteers carry out the work of ARRL to further Amateur Radio. They organize emergency communications in times of disaster and work with agencies such as the Red Cross, the National Weather Service and Civil Air Patrol. Other field volunteers keep state and local government officials abreast of the good that ham volunteers are doing at the state and local level.

## Membership Services

When you join ARRL, you add your voice to those who are most involved with ham radio. The most prominent benefit of ARRL membership is *QST*, the premiere Amateur Radio magazine. *QST* has Amateur Radio news you'll want to know and need to hear. You'll also find a wide range of articles, columns and features— projects to build, announcements of upcoming ham radio activities, reviews of the latest equipment, reports on the role hams are playing in emergencies, and much more.

But being an ARRL member is far more than a subscription to *QST*. The ARRL represents your interests to the FCC and Congress, sponsors contests and other operating events, and offers membership services at a personal level. These include:

- the QSL bureau (which lets you exchange postcards with hams in foreign countries as a confirmation of your contacts with them)
- the volunteer examiner program

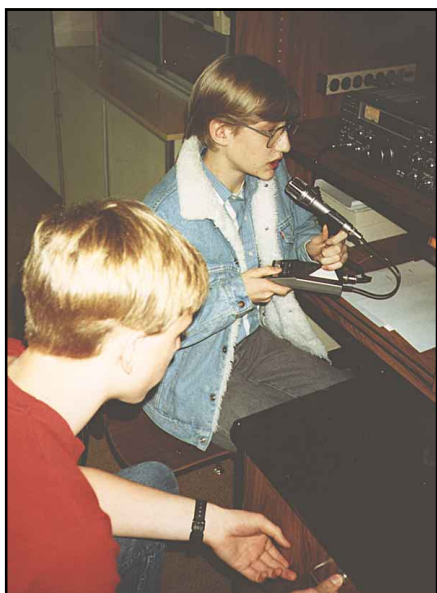
- the Technical Information Service (which provides answers to your questions about any technical subject in Amateur Radio)
- low-cost equipment insurance and much more.

## School Teachers and Volunteer Instructors

ARRL Field & Educational Services (F&ES) provides teachers with materials for using Amateur Radio in their schools. Thousands of teachers have found that Amateur Radio is an ideal way to provide hands-on, intercurricular learning, while enticing students to become interested in science and technology. F&ES also has materials, including newsletters and instructor guides, to help hams who wish to teach Amateur Radio licensing classes.

## WELCOME!

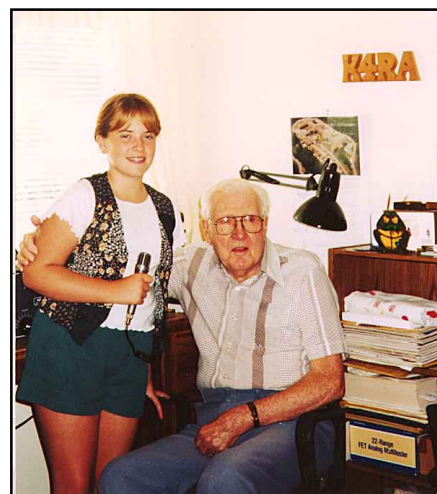
For answers to any questions you may have about Amateur Radio, write or call ARRL Headquarters. See [Resources](#), below, for contact information.



Many hams enjoy talking to far away stations, and gather a good knowledge of geography in the process. Here Bill, KB7JAH, and William, KB7JAG, chat with a ham in Kiribati. Don't know where Kiribati is? (Hint: Parts of the island are the first in the world to greet each new day.)



All-ham families are not unusual. Madison, AB5TV, was the first in his family to become a ham. His wife, Millie, KC5UTP, was not far behind. Here Madison proudly watches Millie make her first-ever contact.



This ham family extends across four generations. Only Andy, K4RA, and great-granddaughter Lisa, KB3BPU, are shown. Not in the picture are Lisa's grandfather Andy, Jr., KE3GY, and her father, Joe, NV3T.

# Glossary

*Note:* Words in ***boldface italics*** have separate entries in the Glossary.

**Amateur Radio**—A radiocommunication 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. (*Pecuniary* means payment of any type, whether money or other goods.) Also called ham radio.

**Amateur Radio operator** — A person holding a license to operate an amateur station.

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

**Amateur service** — Another name for ***Amateur Radio***; one of the radiocommunication services regulated in the US by the Federal Communications Commission (***FCC***).

**Amateur television (ATV)** — A mode of operation that Amateur Radio operators can use to exchange pictures from their radio stations.

**AMSAT** — An abbreviation for the ***Radio Amateur Satellite Corporation***.

**ARRL** — The membership organization for Amateur Radio operators in the US.

**Band** — A range of frequencies. Hams are authorized to transmit on several different bands.

**Beam antenna** — A type of ham radio antenna that can be pointed in different directions.

**Bunny hunt** — Another name for ***fox hunt***.

**Call sign** — A series of unique letters and numbers assigned to a person who has earned an Amateur Radio license.

**Contact** — A two-way communication between Amateur Radio operators.

**Contest** — An Amateur Radio activity in which hams and their stations compete against others to try to contact the most stations within the designated time period.

**Courage HANDI-HAM System** — A membership organization for Amateur Radio enthusiasts with various physical abilities.

**CW** — Abbreviation for *continuous wave*; another name for ***Morse code*** telegraphy.

**Digital communications** — Computer-based communications modes, such as ***packet radio***.

**Digital signal processing (DSP)** — A recently developed technology that allows software to replace electronic circuitry.

**Dipole antenna** — A popular type of wire antenna often used on the high-frequency amateur bands.

**DX** — A ham radio abbreviation for *distance* or *foreign countries*.

**DXCC** — A popular ARRL award earned for contacting Amateur Radio operators in 100 different countries.

**DX PacketCluster** — A method of informing hams, via their computers, about the activities of stations operating from unusual locations.

**DXpedition** — A trip to an unusual location, such as an uninhabited island, where hams operate for a designated period of time. DXpeditions provide sought-after contacts for hams who are anxious to contact that rare location.

**Elmer** — A traditional term for someone who enjoys helping newcomers get started in ham radio on a one-to-one basis.

**Emergency communications** — Amateur Radio communications that take place during a situation where there is danger to lives or property.

**Fast-scan television (FSTV)** — A mode of operation that Amateur Radio operators can use to exchange live TV images from their stations.

**Federal Communications Commission (FCC)** — The government agency that regulates Amateur Radio in the US.



**Field & Educational Services (F&ES)** — Staff at ARRL Headquarters that helps newcomers get started in ham radio and provides materials to hams who want to help newcomers.

**Field Day** — A popular Amateur Radio activity during which hams set up radio stations outdoors and away from electrical service to simulate emergency conditions.

**Field Organization** — A cadre of ARRL volunteers who perform various services for the Amateur Radio community at the local level.

**FM (frequency modulation)** — An operating *mode* commonly used on ham radio *repeaters*.

**Fox hunt** — A competitive ham radio activity in which ham radio operators track down a transmitted signal. Also called *bunny hunt*.

**Ham band** — A range of frequencies on which amateur communications are authorized.

**Ham radio** — Another name for *Amateur Radio*.

**Ham radio operator** — A person holding a written authorization to operate an amateur station. An *Amateur Radio operator*.

**High frequencies (HF)** — The radio frequencies from 3 to 30 MHz.

**International Amateur Radio Union (IARU)** — The international organization made up of national Amateur Radio organizations such as the ARRL.

**International Telecommunication Union (ITU)** — An agency of the United Nations that allocates the radio spectrum among the various radio services.

**Microsat** — A series of small Amateur Radio satellites.

**Mode** — A type of ham radio communication; examples are *frequency modulation (FM)*, *slow-scan television (SSTV)* and *packet radio*.

**Morse code**—A communications mode transmitted by on/off keying of a radio-frequency signal. Hams use the *international Morse code*, which differs from American (telegraph) Morse.

**Net** — An on-the-air meeting of Amateur Radio operators at a particular time, day and radio frequency.

**OSCAR** — An acronym for *Orbiting Satellite Carrying Amateur Radio*, a series of Amateur Radio satellites designed and built by the international ham radio community. Also see *AMSAT*.

**Packet radio** — A computer-to-computer communications mode in which information is broken into short bursts. The bursts (packets) also contain addressing and error-detection information.

**Payload** — A package taken onboard a space flight, such as the Space Amateur Radio *EX*periment (*SAREX*), which allows astronaut/hams to communicate with other hams from space.

**Public service** — Activities involving Amateur Radio that hams perform to benefit their communities.

**QRP** — An abbreviation for low power.

**QSL bureau** — A system of forwarding *QSL cards* to and from ham radio operators.

**QSL cards** — Postcards that serve as a confirmation of communication between two hams.

**QST** — The premiere Amateur Radio monthly magazine, published by the *ARRL*. *QST* means “calling all radio amateurs.”

**Radio Amateur Satellite Corporation (AMSAT)** — An international membership organization that designs, builds and promotes the use of Amateur Radio satellites.

**Radio frequencies (RF)** — The range of frequencies that can travel through space in the form of electromagnetic radiation.

**Radio shack** — The room where Amateur Radio operators keep their station.

**Radiotelegraphy** — See *Morse code*.

**Receiver** — A device that converts radio signals into a form that can be heard.

**Repeater** — An amateur station, usually located on a mountaintop, hilltop or tall building, that receives a signal and retransmits it for greater range.

**SAREX** — An abbreviation for *Space Amateur Radio EX*periment.

**Shortwave listener (SWL)** — A person who enjoys listening to radio broadcasts or Amateur Radio conversations.

**Single sideband (SSB)** — A common *mode* of voice operation on the amateur bands.

**Slow-scan television (SSTV)** — A *mode* of operation in which Amateur Radio operators exchange still pictures from their radio stations.

**Space Amateur Radio *EX*periment** — A payload of Amateur Radio equipment flown in space and operated by astro-nauts who are licensed Amateur Radio operators.

**Technical Information Service** — A service of the *ARRL* that helps hams solve technical problems.

**Transceiver** — A radio transmitter and receiver combined in one unit.

**Transmitter** — A device that produces radio-frequency signals.

**Ultra-high frequencies (UHF)** — The radio frequencies from 300 to 3000 MHz.

**Very-high frequencies (VHF)** — The radio frequencies from 30 to 300 MHz.

**Volunteer Examiners (VEs)** — Amateur Radio operators who give Amateur Radio licensing examinations.

**Wavelength** — A means of designating a frequency *band*, such as the 80-meter band.

**Worked All States (WAS)**—An *ARRL* award that is earned when an Amateur Radio operator talks to a ham in each of the 50 states in the US.

**Worked All VE (WAVE)**—An award that is earned when an Amateur Radio operator talks to a ham in each of the Canadian provinces.

**Work** — To contact another ham.

## RESOURCES

ARRL—the national association for Amateur Radio

225 Main St

Newington, CT 06111-1494

860-594-0200

Fax: 860-594-0259

e-mail: [hq@arrl.org](mailto:hq@arrl.org)

Prospective hams call 1-800-32 NEW HAM (1-800-326-3942)

*ARRL* Web: <http://www.arrl.org>

Membership organization of US ham radio operators and those interested in ham radio. Publishes study guides for all Amateur Radio license classes, a monthly journal, *QST*, and many books on Amateur Radio and electronics.

AMSAT NA (The Radio Amateur Satellite Corporation, Inc)

PO Box 27

Washington, DC 20044

301-589-6062

Membership organization for those interested in Amateur Radio satellites. Publishes *The AMSAT Journal*, monthly.

Courage HANDI-HAM System

3915 Golden Valley Rd

Golden Valley, MN 55422

763-520-0511

Provides assistance to persons with disabilities who want to earn a ham radio license or set up a station.

***Now You're Talking! All You Need for Your First Amateur Radio License, Fourth Edition***  
**(Newington, CT: ARRL)**

Complete introduction to Amateur Radio, including the exam question pool, complete explanations of the subjects covered on the exams. Tips on buying equipment, setting up a station and more.

***The ARRL's Tech Q & A, Second Edition*** (Newington, CT: ARRL)

All the questions on the Technician exam, with the correct answers highlighted and explained in plain English. With many helpful diagrams.

***Your Introduction to Morse Code*** (Newington, CT: ARRL)

A set of audio CDs (or cassette tapes) that make learning Morse code fun. Teaches all letters, numbers, and other required characters, and provides practice text.

***Morse Tutor Gold***

Software for IBM PCs and compatibles that teaches the code and provides plenty of practice at user-selected speeds from 1 to 100 words per minute.