

The New-Ham FAQ

Fascinating Things You Might Want to Know Now That You've Passed Your Amateur Radio Exam

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First off, congratulations on passing your exam! We welcome you to the fraternity of amateur radio operators. You no doubt have a few questions, and we just happen to have a few answers.

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MY NEW OR UPGRADED LICENSE

How do I check my license status online?

Just go to <http://wireless2.fcc.gov/UlsApp/UlsSearch/searchLicense.jsp>. Select “By Name” in the license search box at the center of the page and enter your last name next to it (if you have a common last name, enter your last name, a comma, a space, and your first name).

When can I go on the air?

If you were unlicensed when you passed the exam, you can go on the air as soon as your new call sign shows up in the FCC database. Take a test on Saturday, and it’s a good bet that your new status will appear in the FCC database by the following Friday.

If you already have a license you can use your new privileges immediately; just be sure that you use the appropriate call sign suffix if you’re transmitting in a frequency segment not permitted under your old license. Use /AT if you’ve upgraded to Technician, /AG if you’ve upgraded to General, and /AE if you’ve upgraded to Amateur Extra.

When will I get my paper license?

You should receive it about two weeks after your new license status appears in the FCC database.

CALL SIGNS

What kind of call sign will I be given?

Amateur radio call signs take one of the following forms:

- 2-by-3 – two letters, a number, and three letters (e.g., KA6BCD)
- 1-by-3 – one letter, a number, and three letters (e.g., K6BCD)
- 2-by-2 – two letters, a number, and two letters (e.g., KA6BC)
- 1-by-2 – one letter, a number, and two letters (e.g., K6BC)
- 2-by-1 – two letters, a number, and one letter (e.g., KA6B)
- 1-by-1 – one letter, a number, and one letter (e.g., W6A)

All United States call signs start with A, K, N, or W. The number in the call represents one of ten call sign districts; for California, the district number is 6. A map of the different districts can be found at <http://ac6v.com/images/USAMAP3.jpg>.

If you’re currently unlicensed and have just passed the tests for a Technician or General class license, you’ll be assigned a 2-by-3 call; if you’re currently unlicensed and have just passed the test for an Extra class license, you’ll be assigned a 2-by-2 call¹.

¹ There are a few places outside the continental US, like Alaska, where the call assigned might be of a different form.

Call signs are sequentially assigned within each of the 10 call sign districts. Your call sign district is based on the mailing address you put on the NC605 form. For example, if you took the test in California but gave a mailing address in New Jersey, you'd be assigned a district 2 call sign.

Will I be assigned a new call every time I pass a license exam?

You'll be assigned a new call only if you ask for one. If you're already licensed and would like a new call for your license upgrade, you have to check the box next to "change my station call sign systematically" on the NC605 application form, then initial underneath.

Can I apply for a custom call sign? How?

You can obtain a call sign of your own choosing, within reason. The FCC allows licensed amateurs to apply for a new call through their vanity licensing program; you can make an application either by mail or online. The ARRL outlines the procedure at <http://www.arrl.org/applying-for-a-vanity-call> . Of course, the call you are asking for has to be available, and must be permitted for your license class, as listed below:

- Technician and General: 1-by-3 or 2-by-3
- Advanced: Any of the above plus 2-by-2
- Extra: Any of the above plus 1-by-2 or 2-by-1.

Note that 1-by-1 calls are reserved for special-event stations.

We've only scratched the surface here. For a more complete description of the vanity call sign program, go to <http://www.arrl.org/vanity-call-signs> . Another excellent resource to draw on is <http://www.vanityhq.com/> ; this site describes the vanity call sign program in excruciating detail, and gives you an easy way to determine just which call signs are currently available.

Can I choose a vanity call sign from another district?

Yes. For example, if you've been assigned a district 6 call sign, you could choose a district 8 vanity call sign.²

Can I get a vanity call sign and keep my current call sign?

No: amateur radio call signs are one to a customer.

How much does a vanity call sign cost?

The current fee is \$13.30 for a ten-year license term.

Can I apply through your VE group for a vanity call sign?

Unfortunately, no you can't. New vanity call applications have to be made with the FCC.

² There are some restrictions: KL7 is restricted to Alaska, KH6 to Pacific islands, and KP4 to Puerto Rico.

KEEPING YOUR LICENSE CURRENT

How often do I have to renew my license? Do I have to be retested?

First things first: *you do not have to be retested to renew your license.*

Licenses are good for a term of 10 years. You can renew your license online, cost-free, by going to the FCC web site up to 90 days prior to the expiration date. The current URL for this is http://wireless.fcc.gov/services/index.htm?job=cft&id=amateur&page=cft_renew_amateur, but there's a better-than-even chance that link won't work in 10 years. When it's time, just go to the FCC site and look around.³

You can also renew your license by printing out an NC605 form and handing it in at any ARRL-sponsored VE session up to 90 days prior to the expiration date. If you're an ARRL member, this will be processed free of charge; if not, there'll be a fee.

What happens if my license expires?

There's a two-year grace period after license expiration, during which time you can renew your license without being retested. (Note, however, that you *cannot* go on the air with an expired license, grace period or no.)

If you don't renew within the grace period, you'll have to be retested before you can go on the air again. Don't let this happen to you—make a note in Google Calendar right now.

If I've just passed an exam to upgrade my existing license, does my license term get extended for another ten years?

NO! As a rule, your license term end date will *not* change when you upgrade your license. If your old license is within 90 days of expiring when you pass your upgrade test, let us know. We can show you the box to check on the NC605 form that will renew your license at the same time it's upgraded, at no additional cost.

Is there anything else I should do to ensure that my license stays valid?

Well, there's the obvious: make sure you obey all FCC amateur radio regulations. A less-obvious but important thing to do is to *make sure the FCC always has your current mailing address.* You can update your address online at no cost at <https://wireless2.fcc.gov/UlsEntry/licManager/login.jsp>; you'll need your FRN and password to log in.

³ To renew your license online via the FCC's Universal Licensing System (ULS), you'll need a Federal Registration Number (FRN) and password. If you don't already have an FRN, one will be assigned to you when your license is granted; it'll be listed in the FCC database and appear on your paper license. You should receive your password in the mail a couple of weeks after you receive your paper license. If you want to change your password to something easier to remember, you can do so at the FCC Registration web page (<https://fjallfoss.fcc.gov/coresWeb/publicHome.do>). For more information on the ULS, go to <http://www.arrl.org/universal-licensing-system>.

NATIONAL ORGANIZATIONS

Are there national organizations for amateur radio operators?

The most widely recognized national organization for radio amateurs in the US is the American Radio Relay League, or ARRL. The ARRL is probably best known for its monthly magazine, *QST*, which contains technical articles, regulatory updates, contest calendars, lists of special operating events, and other things of interest to amateur radio operators. In addition, the ARRL serves as ham radio's advocate in Washington, keeping an eye on developments in the FCC and in Congress. It also happens to be the biggest Volunteer Examiner Coordinator (VEC) in the country.

The ARRL maintains a nice web site chock full of information for hams, at <http://www.arrl.org>. If you look around and like what you see, you can join up by going to <http://www.arrl.org/membership>.

RADIO CLUBS

Why should I join a local radio club? What do they do?

Radio clubs are a great place to meet fellow radio amateurs. You can swap stories, ask questions, get opinions on equipment, etc. Many clubs have monthly meetings at which, in addition to usual club business, someone makes a presentation about some facet of amateur radio. As a rule, clubs also sponsor operating events (Field Day in June is always popular) and other get-togethers. Clubs may also maintain repeaters, typically on VHF and UHF bands.

Where can I find a local radio club to join?

We're blessed with *many* clubs in the Area; here's just a sampling:

- Raritan Valley Radio Club (W2QW) <http://www.w2qw.org>
- Electronic Technology Society of New Jersey (K2ETS) <http://www.k2ets.com>
- Tri-County Radio Association (W2LI) <http://www.w2li.org>
- Piscataway Amateur Radio Club (K2VOA) <http://k2voa.homestead.com/>

The ARRL maintains a list of affiliated at <http://www.arrl.org/find-a-club>.

UPGRADING YOUR LICENSE

I've heard that there are several different types of amateur radio license. I just passed the Technician exam—is there any advantage to going for another class of license?

Make no mistake: you can do a *lot* with a Technician license, which gives you access to all amateur radio frequencies above 30 MHz, as well as limited operation at modest power levels in certain bands below 30 MHz. That's more than enough to keep you happily occupied for years.

That said, there are advantages to upgrading to one of two other license classes:

- *General class* – Operations above 30 MHz tend to be somewhat limited in range. With a General license, you get extensive access to bands below 30 MHz at high power (up to 1500 watts PEP on most bands), allowing you to communicate world-wide. You also retain access to all bands above 30 MHz.
- *Amateur Extra class* – This class of license gives you access to *all* amateur radio frequencies. In particular, Amateur Extras get access to additional phone (i.e., voice) and CW (Morse code) frequency allocations in the 80-, 40-, 20-, and 15-meter bands. This might not mean much to you today, but years from now, when you're trying to work your 250th country, those additional frequencies will come in handy. One other thing—as VEs, Amateur Extra licensees can administer tests for all license classes.

How do the tests for General class and Amateur Extra differ from the Technician test?

Amateur radio tests are cumulative:

- To obtain a Technician license, you have to pass the test for Element 2. This you already know about.
- To obtain a General class license, you have to pass the tests for Elements 2 and 3. The Element 3 test has 35 questions; you'll be asked intermediate-level questions about regulations, operating practices, and radio theory. In short, it's harder than Element 2.
- To obtain an Amateur Extra license, you have to pass the tests for Elements 2, 3, and 4. The Element 4 test has 50 questions on advanced electronics theory and specialized operating practices. In short, it's harder than Element 3.

Note that if you have an unexpired Technician class license, or a Technician class license that expired less than two years ago, you'll get credit for Element 2. Similarly, if you have an unexpired General or Advanced⁴ class license, or a General or Advanced class license that expired less than two years ago, you'll get credit for Elements 2 and 3. *In other words, as long as you keep your license current, you don't have to take these elements over again!*

I just passed the Technician class test. I want to take the General class test at the very next test session, but I probably won't have my paper license yet. What do I do?

Not a problem--just bring your CSCE (that form we gave you just before you left the test session) with you. It'll serve as proof that you passed the Technician test. Similarly, if you want to take the Extra class exam but don't yet have the paper version of your General class license, just bring your CSCE *and* your Technician license to the exam session.

Do the higher classes of license require that I pass a Morse code test?

NO! Morse code tests were phased out in 2007.

⁴ Advanced class licenses are no longer issued, but there are still quite a few Advanced class hams out there. Like other amateur radio licenses, Advanced class licenses can be renewed indefinitely.

What's the best way to study for these tests?

There are three basic approaches: study guides, online practice tests, and classes.

Study guides come from a variety of sources.

The ARRL's study guides tend to be the gold standard. They come in a couple of flavors: license manuals and Q&A books. As the name suggests, the Q&A books list all exam questions and answers; each correct answer is accompanied by a brief explanation of why the correct answer is, well, correct, thus serving as directed learning. The license manuals delve more deeply into the theory and regulations behind the questions.

Also very popular are study guides written by Gordon West, WB6NOA.

You can buy study guides from the ARRL or Amazon.com, or locally from Ham Radio Outlet in Sunnyvale. The ARRL Q&A guides are also downloadable for the Kindle. ***If you do buy a study guide, make sure that it covers the material for the current question pool—the range of dates should be on the cover or somewhere up front.*** (The exam questions change every few years, so it's all too easy to buy an out-of-date book!)

Dan, KB6NU, offers a couple of free study guides for the Technician and General license tests:

Technician: http://www.kb6nu.com/wp-content/uploads/2010/06/2010_Tech_Study_Guide.pdf

General: <http://kb6nu.com/2007GeneralStudyGuide.pdf>

These well-written study guides pack a lot of information into a small number of pages. They're worth a look.

The Foothills Amateur Radio Society (FARS) has developed a very nice set of presentations covering the material for the General class license. You can find these presentations online at <http://www.fars.k6ya.org/class2010spring/>.

Jack, AD7FO, has written a guide to preparing for the Extra class license exam, which you can find at <http://www.arrl.org/files/file/Instructor%20resources/ExtraClassSylalbus2009jan-AD7FO.pdf>

Online practice tests are available at several web sites. Here are some you might try:

- Radioexam.org – <http://www.radioexam.org>
- KBOMGA.net - <http://kb0mga.net/exams/>
- AA9PW.com - <http://aa9pw.com/>
- QRZ.com - <http://www.qrz.com/testing.html>
- EHam.net - <http://www.eham.net/exams/>

(Most of this list was shamelessly lifted from one of KB6NU's study guides.)

All of the sites listed above are free. There's also a pay site, <http://www.hamtestonline.com>, offering a testing/training scheme somewhat more elaborate than what's available at the free sites.

One caveat: when you use these practice sites, make sure you get to the point where you're passing the test with some safety margin before you take the actual exam. In our experience, test day jitters tend to make your score on the real exam somewhat lower than what you achieve online.

Classes offer you the opportunity to learn the test material from experienced amateur radio operators who can answer your questions; many of these classes offer exam sessions at the end. Classes for the Technician license are common, classes for the General license less so. Classes for Amateur Extra are tough to find. You can get a list of available classes at <http://www.arrl.org/find-an-amateur-radio-license-class>. Amateur radio club bulletins are also a good source of information on classes.

OK, I'm ready to take another exam. When's the next scheduled exam session?

The Electronic Technology Society of NJ holds it's VE sessions between September and May of each year. The exams are held at 8 AM on the second Saturday of each month. The Raritan Valley Radio Club testing dates can be found at its web site under the VE Exams section. RVRC sessions start at 8:30 AM. This is also true of the Tri-County Radio Association. There's no need to make an appointment, but it's a good idea to call the contact person listed for each session. You can find up-to-date information on VE sessions at the ARRL website located at <http://www.arrl.org/finding-an-exam-session> ..

BECOMING A VE

VE work looks interesting. What do I have to do to become one?

VE work *is* interesting: it's fun to help other hams become licensed, or move up the licensing ladder and obtain more operating privileges. It's also fun to talk to newly-licensed hams. Not to mention that we usually have donuts. If you have a General, Advanced, or Amateur Extra license and are 18 or older, you, too, can join in.

Our particular VE group is associated with the ARRL VEC. To become an ARRL VE, just do the following:

- Go to <http://www.arrl.org/ve-manual> and download a copy of the ARRL VE Manual. Read it and familiarize yourself with the material.
- Print and fill out the VE application form and open-book review (VE Manual pages 75-78). Send both to the address at the top of the application form.

It's that simple! In two or three weeks you'll receive a VE certificate and a handsome laminated badge, at which time you can join our group of dashing VEs. Or join some other group of ARRL-affiliated dashing VEs. Your choice.

Does it cost anything to become a VE?

No. VE accreditation is free.

GETTING ON THE AIR

What kind of equipment should I buy?

Before plunging into any purchase, it's best to ask your fellow amateur radio operators what their experience has been. We're all opinionated, and not necessarily always in agreement about what constitutes good gear, so it's wise to ask at least a few hams what they think of a certain piece of equipment before you buy it. Radio clubs are a great place to meet fellow hams and solicit their opinions.

Also useful is the website <http://www.eham.net>, which has a section devoted to reader-provided equipment reviews. Each review consists of a numerical rating and a written assessment. The written assessments can be quite useful, the numerical ratings less so (many hams like to think that each piece of equipment they own is either the best thing ever or the worst fraud ever perpetrated on an unwary buying public, so the numerical ratings tend to be bimodal). Remember, too, that even the best gear has its detractors, and the worst gear its supporters.

Where can I buy equipment?

There aren't that many amateur radio equipment retail outlets in the US, so a lot of gear is sold by mail. The back pages of *QST* are full of advertisements for amateur radio equipment sellers large and small. Just to get you started, here's a by-no-means-exhaustive list of some of the larger equipment outlets, in no particular order:

- Ham Radio Outlet (<http://www.hamradio.com>)
- Amateur Electronic Supply (<http://www.aesham.com>)
- R&L Electronics (<http://www.randl.com>)
- Texas Towers (<http://www.texas-towers.com>)
- Hamcity.com (<http://www.hamcity.com>)
- Cheap Ham (<http://www.cheapham.com>)

There's a lot of good, used equipment to be had, as well. Take a look at the listings on eham.net and E-Bay to get an idea of what's available. There's also some bad equipment out there, so be careful.

What kind of antenna should I put up?

If you stay a ham for 50 years, you'll never get to the end of all the antenna advice to be had. Some of it is good, some awful, and the rest somewhere in between. Rather than try to give you a five-decade data dump, we'll leave you with two general guidelines:

- Rule #1: There's an old ham radio saw to the effect that \$1 spent on an antenna is worth \$10 spent on a radio. In other words, the fanciest rig in the world won't do you as well as a decent antenna.
- Rule #2: Some hams, having encountered Rule #1, incorrectly conclude that if they can't put up a great antenna, there's no use in even trying to get on the air. Yes, the better the antenna, the better you'll do, but even a so-so antenna can give you good results. Not that we're recommending it, but hams have put a signal on the air by attaching their rigs to gutters, to

bedsprings, to what-have-you. If you're dealing with a small lot, or the constraints of an apartment, or neighborhood covenants, rest assured that others have dealt with them as well.

Here are a few places to look for information:

There's an ARRL book called *Simple and Fun Antennas for Hams*, a compendium of HF, VHF, and UHF antennas, most of which are fairly straightforward. You can find more information at <http://www.arrl.org/shop/Simple-and-Fun-Antennas-for-Hams/>. At least a dozen other ARRL books are dedicated to antennas, as well.

If you do face constraints, take a look at this ARRL web page dedicated to indoor antennas and limited-space outdoor antennas: <http://www.arrl.org/limited-space-and-indoor-antennas> .

AMATEUR RADIO ACTIVITIES

I know that hams talk to one another on radios. But what do they *do*, exactly?

There are so many different activities in amateur radio that it's tough to make a comprehensive list. Some hams concentrate on one or two activities exclusively, while others prefer to sample the entire buffet. Here's a brief list of just some of the things that hams are doing.

FM and Repeaters

FM (frequency modulation) first became popular among amateur radio operators in the late 60's and early 70's. Using small VHF and/or UHF FM rigs, including handhelds, hams can communicate over moderate distances by passing their transmit signals through repeater stations. The good voice quality and static immunity of this mode, combined with the relatively low cost of equipment, the ready availability of repeaters, and the fact that virtually all repeaters are on frequencies accessible to Technician class licensees, makes FM a natural first operating mode for many a new ham.

AM Operation

When hams first started using voice communication back in the Cretaceous Period, amplitude modulation, or AM, was the mode they used. The voice quality of AM is very good; unfortunately, AM has a relatively wide bandwidth (i.e., it takes up a significant amount of space on the band) and is somewhat wasteful of power, and for those reasons has dropped greatly in popularity over the years. You can still find it, though, particularly on the 75-meter band. Its proponents like the way it sounds, and they have a point—a well-designed and well-maintained AM transmitter has beautiful audio.

SSB Operation

SSB, or single-sideband, is the prevailing form of voice communication on HF bands. While SSB transmitters and receivers are somewhat more complex and costly than their AM counterparts, the narrow bandwidth and power efficiency of this mode makes it a popular choice. Tuning in SSB takes a little practice—a mistuned signal makes the person at the other end sound a bit like Donald Duck—but it's a skill that can be picked up quickly.

CW Operation

The earliest form of amateur radio communication, CW, or continuous wave⁵, is the sending and receiving of Morse code. At one time this mode was so dominant in ham radio, and Morse code skills so essential, that Morse sending and receiving tests were part of the amateur radio exams. While Morse testing is no longer required, many hams continue to operate CW, for several reasons:

- CW is a fairly efficient mode, in that you can communicate over long distances with relatively modest power output and so-so antennas.
- The radio equipment needed is simple, which is of particular appeal to those who build their own rigs from kits or from scratch.
- CW is fun. That might not be readily apparent to someone who's never tried it, and counterintuitive to anyone who's trying to *learn* Morse code, but it's true nonetheless.

If you'd like to learn Morse code, you can download training programs for your computer, or use web-based training sites. Here are a couple places to look:

- G4FON Morse Trainer, a free Morse trainer for Windows machines - <http://www.g4fon.net/CW%20Trainer.htm>
- Learn CW Online, a web-based Morse trainer - <http://www.lcwo.net/>

You can also listen to code practice sessions broadcast from ARRL headquarters station W1AW. A schedule and list of operating frequencies appears at <http://www.arrl.org/w1aw-operating-schedule>.

Digital Mode Operation

Long before the age of personal computers, hams were transmitting and receiving information in digital form, i.e., as strings of ones and zeroes. Amateur radio operators connected surplus World-War-II teletype machines to their rigs and exchanged text messages as early as 1946; radio teletype, or RTTY, is still popular today, particularly in contests.

Easy access to computers has revolutionized digital communication for hams. If you have a recent-vintage (read: frequency-stable) SSB transceiver and a reasonably capable computer with a sound card, about \$10 of components is all it takes to connect the two. If you don't want to build your own interface, it's easy to find a pre-built one, albeit at a higher price. Add some free, readily-available software and you've got yourself a nice digital station.

There's a plethora of digital modes to wade through. For HF operation, the mode almost everyone starts with is PSK31. This mode uses phase-shift keying to send symbols at a rate of ~31 baud; if that means nothing to you, it's OK—you can learn the technicalities later. PSK31 is a great mode for low-power operation, with most PSK stations transmitting 40 watts or less. Even with that kind of power and a not-so-great antenna, you can make contacts reliably at considerable distances.

⁵ Purists will point out that “continuous wave” is something of a misnomer, as the transmit signal is turned on and off to send dits, dahs, and spaces. “Continuous” in this context means that the wave is unmodulated.

A web search for “PSK31” will give you a lot of places to look for info. The following are of particular interest:

- W2MU has useful information on the construction of computer-to-radio interfaces at <http://www.qsl.net/wm2u/psk31.html> .
- Randy, K7AGE, has produced a series of videos on how to set up and run a PSK31 station, which he’s posted to YouTube. Just go to <http://www.youtube.com> and do a search for “K7AGE”.
- There’s so much software out there that it’s a bit of a chore for beginners to dig through it all. A few packages—all free—that you might want to look at first are:
 - Digipan 2.0 for Windows. This program, which supports several PSK modes, is kind of dated, but is simple to use and works well even on older, less powerful computers. <http://www.dxzone.com/cgi-bin/dir/jump2.cgi?ID=2707>
 - Ham Radio Deluxe and DM780 for Windows. HRD is an exceptionally nice collection of programs; DM780 is the digital modes portion of the suite. HRD includes every capability but the kitchen sink, so it takes a while to learn all the features of HRD. <http://www.ham-radio-deluxe.com/>
 - Fldigi, available for Linux or Windows, is a favorite of many operators who like digital mode but aren’t big fans of Microsoft. <http://www.w1hkj.com/Fldigi.html>

Emergency Communication

Amateur radio has a long and proud history of providing communication during disasters, when other forms of communication are unreliable or unavailable. The ARRL provides an overview of amateur radio emergency communication here: <http://www.arrl.org/emergency-communications> .

If you’d like to train for and participate in emergency communication, there are plenty of local resources to draw on; here are just a few:

- Hudson Division NNJ ARES website <http://www.hudson.arrl.org/nnj/ares/>
- State of NJ CERT recruitment program <http://www.state.nj.us/njoem/cert/>

Satellites

Hams were among the first to hear the plaintive beeps of Sputnik 1 after its launch in late 1957. Just over four years later, amateur radio operators launched their own 10-pound satellite, OSCAR⁶ 1, which served

⁶ Orbiting Satellite Carrying Amateur Radio

as ballast on a US Air Force launch. While its onboard 2-meter beacon worked for only three weeks, OSCAR 1 started a tradition of amateur radio satellite operation that continues to this day. There are currently over two dozen amateur satellites orbiting the earth in various states of operability, launched by a number of different groups across the globe (there are also many older satellites that are now completely inoperative). The latest OSCAR satellite is Hope OSCAR 68, which was launched in late 2009. Like many amateur radio satellites, OSCAR 68 has transponders that receive signals on one band and retransmit them on another, allowing earth-bound hams to make contacts through them. Specifically, OSCAR 68 has three transponders—one for FM, one for SSB/CW, and one for 1200bps AFSK—that receive signals on 2 meters and retransmit them near 435 MHz.

You can find out more about amateur satellite operation at <http://www.amsat.org/amsat-new/index.php> . You can also obtain the *ARRL Satellite Handbook*; see <http://www.arrl.org/shop/The-ARRL-Satellite-Handbook> .

Equipment Construction

There was a time when almost all hams built their own equipment, if for no other reason than that in the early days of amateur radio, little or no commercially-built equipment was available. Even with the today's ready supply of off-the-shelf gear, many hams enjoy rolling their own, either by assembling kits or by building something from scratch based on a description in an amateur radio publication. A few intrepid hams even design their own gear. The from-scratch type of building can be a little intimidating for beginners, but kit building can be done by anyone possessing a minimal degree of coordination and the ability to follow instructions.

If you want to get an idea of what's available in kit form, here are links to just a few of the many amateur radio kit vendors:

- *Small Wonder Labs* sells a number of high-quality, low-power CW and PSK31 transceiver kits. <http://www.smallwonderlabs.com/>
- *Hendricks QRP Kits* sells kits for low-power HF transceivers, antenna tuners, and even a dummy load. <http://www.qrpkits.com/index.html>
- *Elecraft* sells several HF transceiver kits, ranging from low-power CW rigs to extremely sophisticated high-end transceivers. <http://elecraft.com/>

These mentions aren't endorsements, *so caveat emptor*.

By the way, Heathkit amateur radio kits are no longer made. If you feel you absolutely have to build your own Heathkit, search on E-Bay for "unbuilt Heathkit." Be prepared to pay dearly for the privilege, though.

If you've thought about building equipment but have never picked up a soldering iron, take a look at this tutorial: http://mightyohm.com/files/soldercomic/FullSolderComic_EN.pdf .

In recent years there's been something of an across-the board revival in making things with one's own hands, perhaps best exemplified by the Maker Faires that have been springing up around the country. Not

surprisingly, there's more than a little overlap between Maker culture and amateur radio, and if you go to one of these events, you're likely to see a ham radio exhibit. You can find out more at <http://makerfaire.com/>.

Software-Defined Radio (SDR)

By tradition, amateur radio gear is supposed to have knobs, switches, and meters, and the more the better. Recently, some amateurs have begun to challenge this convention by replacing their radios with featureless boxes that connect to an antenna on one end and a computer on the other. These boxes, controllable from the computer, convert incoming radio signals to a series of numbers that are transferred to the computer for further processing; the resulting audio is output to speakers, headphones, or, in the case of digital modes, another computer program. Something of the reverse happens on transmit. The operator controls the box from a virtual control panel on the computer display.

These rigs and the computer programs that support them are implementing something called software-defined radio, or SDR, the name arising from the fact that many of the operations needed to either receive or transmit a radio signal—modulation, demodulation, filtering—are now done in software. This has several advantages. First, SDRs tend to be very flexible, in that changes to the radio can be made by reconfiguring software. This means both that the operator has a lot of latitude in adjusting the radio, and that the vendor of an SDR device can continue to make and deploy upgrades long after you purchase a transceiver. Second, SDR software offers adjustable, razor-sharp filtering. Third, most SDRs output a wideband signal to the computer, on the order of 96kHz to 192kHz; the upshot is that the computer can display all the signals in a 48 to 96 kHz bandwidth at once. To an operator who's used to being able to hear a bandwidth of perhaps 3 kHz, seeing all of the signals in a 96 kHz chunk of an amateur radio band all at once is a transformative experience.

Several vendors offer SDR kits and assembled products. Perhaps the largest is FlexRadio (<http://www.flex-radio.com/>), which sells a series of HF SDR transceivers. Should you decide to go the SDR route, you'll have to contend with the “real radios have knobs” and “real radios have a front panel” and “real radios have dead spiders in the bottom of the case” crowd, but it's a small price to pay.

One word of warning: getting an SDR transceiver to work properly with a computer can be, shall we say, a growth experience. If you don't feel comfortable playing around with computers as anything more than a user of applications, SDR may not be your cup of tea.

Contesting

Some hams live to participate in contests; these are scheduled events in which operators get on the air and try to make as many contacts as possible, usually in some fixed time period. Each contest has its own rules, but there are a few common threads. For a contact to be valid, you have to give the person at the other end some standard set of information—maybe a signal report and your ARRL section, for example—and obtain the same information from them. You keep a log of all contacts, then use a formula described in the contest rules to determine your score. As a rule, you'll get more points for having worked hams in different geographical areas, or on different bands. When the contest is over, you send the log to the contest administrators, who collate the information, publish the results, and hand out awards to the top scorers.

You can find contest calendars in every issue of *QST*, and at <http://www.arrl.org/contest-calendar>.

If you do decide to operate a contest, it's important to read the contest rules first, and operate only within the specified frequencies ranges during the specified times. Note, too, that contest operation in the 30-, 17-, and 12-meter bands is generally frowned upon.

QSL Collecting

Almost as old as the hobby itself, QSL cards are pre-printed postcards that hams send to one another to confirm a contact. QSL cards range from the simple and plain to elaborate full-color designs. In addition to being collected for their own sake, these cards can serve as proof of contact when applying for awards (see below).

In recent years quite a few hams have taken to exchanging QSL cards electronically. The two most popular electronic QSL systems are eQSL (<http://www.eqsl.cc>) and the ARRL's Logbook of the World, or LOTW (<http://www.arrl.org/logbook-of-the-world>). You upload contact information to these services, where it's recorded and matched with information from those you contacted. One important note: electronic QSLs are not universally recognized as a valid way to confirm a contact. Before trying for an award, check to see whether the electronic QSL service you plan to use is recognized as valid by the folks granting the award.

Awards

It's a question that comes naturally to most new hams: I wonder how many counties/states/countries I could contact? For some, that question becomes a quest, and those hams spend a significant number of on-air hours looking for that elusive country or rare state to add to their list.

To recognize the achievements of such hams, organizations award certificates or plaques to operators who have worked enough states, or countries, or whatever's of interest to the award giver. There are many, many available awards; some of the more prominent ones are:

- Worked All States – This ARRL award recognizes hams who have made and confirmed a contact in each US state. Special certificates and endorsements are awarded for making all contacts in a given mode or on a given band. There's more information at <http://www.arrl.org/was> .
- DX Century Club (DXCC) – Hams who've worked and confirmed at least 100 countries can earn this ARRL award. Once you achieve the DXCC, you become part of the ARRL's online list of standings; as you work more countries, you move up the list. Find more information at <http://www.arrl.org/dxcc> .
- Worked All Continents (WAC) – If the thought of working one hundred countries seems a little intimidating, this IARU-sponsored award may be an easier place to start. Get more information at <http://www.arrl.org/wac>.
- USA-CA - If working all states seems just too darned easy, you can try working all counties. The publisher of CQ Magazine sponsors a series of awards for counties worked, starting at 500 and ending at, well, all of them. You can get more information at the CQ Amateur Radio site http://www.cq-amateur-radio.com/cq_awards/cq_usa_ca_awards/cq_usa_ca_awards.html . You

can find out about other CQ Magazine awards at the site again for CQ Amateur Radio http://www.cq-amateur-radio.com/cq_awards/index_cq_awards.html .

Special Events

Hams are not above using almost any special occasion as an excuse to operate their radios. Whether it's the commemoration of some historical event, a Boy Scout Jamboree, a get-together to honor a person or group, or just the Termit Valley Sauerkraut Festival, some hams might just decide to set up a station to support the event, and to (of course) make as many contacts as possible. Many of these stations give out special QSLs or certificates to those they contact. Each issue of *QST* lists special events for that month, with information on frequencies, times, and instructions for getting the QSLs or certificates. The ARRL also maintains this information online at <http://www.arrl.org/events/search> ; just select "Special Event" next to "Type" near the top of the page, and specify the date range of interest near the bottom.

Hamfests and Conventions

Hamfests are amateur radio get-togethers, usually sponsored by clubs. Activities vary, but a typical hamfest might have a flea market, tailgating (i.e., hams selling equipment from the backs of their cars or trucks), refreshments, and even VE test sessions.

The ARRL sponsors a series of conventions—larger hamfests, really—that offer, in addition to the above, presentations and seminars on various topics of interest to amateur radio operators, as well as equipment displays by vendors. Our local conventions are Pacificon (<http://www.pacificon.org>) and the Monterrey RadioFest (<http://www.radiofest.org/>).

You can find a monthly convention and hamfest calendar in the pages of *QST*, and online at <http://www.arrl.org/hamfests-and-conventions-calendar> .