

Choosing Your First Handheld Radio

by Rich Stiebel, W6APZ, Customized by AB6HB

New hams frequently ask, "Which radio should I buy?" Most of these new hams are products of a one-day "hamcram" licensing session. Many of these licensees have obtained their licenses so that they can be more effective in helping with their CERT (Community Emergency Response Team) groups in emergencies. Because of this, they know that they want a handheld radio, but they do not know what is important to look for in an HT (handheld or Handie-Talkie®). The ham radio magazines run survey articles every few years comparing the features and prices for current HTs. Manufacturers are constantly coming out with new rigs with various features, so it is difficult to recommend one radio today that will also be the choice tomorrow. What I can do is to recommend certain features found to be helpful, and mention some features to avoid. First, I will list these below; then discuss each feature.

I recommend that a radio have the following features:

- Keypad for direct frequency entry
- 5-watt RF output • Sub-audible tone: encode and decode
- Computer programmable with software and interface cable
- External DC connection so the radio can be connected to and operated from an external battery or power supply
- Available AA battery pack
- Illuminated frequency display and keypad
- Repeater "reverse" button
- Easy-to-understand manual
- Nifty! Mini Manual™ Users Guide
- Several dozen memory slots for repeaters and simplex frequencies
- Robust antenna connector
- Jack for an external earphone and/or speaker

Optional features:

- External microphone jack

I would try to avoid radios that:

- Are not operationally intuitive
- Provide only one watt or less of power output
- Have a built-in antenna with no possibility of connecting an external antenna
- Are only programmable with a computer

Other Considerations:

- How many bands?
- General coverage vs. ham band only
- Price

Direct Frequency Entry

Keypad vs No Keypad. Some very compact radios save space and cost by not having a keypad on the radio. To program these radios, one has to go into the VFO mode (which frequently starts with the band edge or a pre-programmed frequency in the band) and scan the band sequentially until the desired frequency is found. At this point, one can save this frequency to memory, but this process may require pressing many buttons in the proper sequence to place the desired frequency in the desired memory position. Push a button at the wrong time and the process must be started over. To enter the next frequency, the procedure is repeated. This can be a very time-consuming task, but the result is a very usable radio, if the only frequencies one needs are those you have stored

in the memories. This type of radio can be used as a monitor rig for your local repeater, but I would not recommend it for CERT work. Why not?

In emergencies, one often has to change frequencies to accommodate the local area situation. For example, if the repeater goes out, one may need to switch to a different machine, or switch to operate on the repeater output. If you are assigned to a post outside your usual repeater area, you may need to program in a new frequency.

With direct frequency entry using the telephone style keypad on the front of the radio, this is easy; without it, entering a new frequency is a chore. It also allows you to access VoIP connected stations to communicate around the world.

5-Watt RF Output

Shirt pocket-sized radios are cute and are good for monitoring your local repeaters, but I would avoid them for serious emergency work. While 100 milliwatts may give you a clear signal into your local repeater, when disaster strikes, you can't count on your local repeater to be on the air. In such cases, direct contact between two hams provides the most reliable communication. This depends upon each ham's RF power output and antennas. The higher your output and the better and higher your antenna, the greater distance over which you will be able to communicate.

Computer Programmable with Software and Interface Cable

Most radios marketed in the past ten years offer the ability to be programmed via computer. Some manufacturers offer free software but require the purchase of an interface cable. Others have contracts with developers to produce high quality software and cables for \$40-\$50 and provide excellent tech support. Free software is available online written by Commander or Chirp but you'll need to buy a cable for your model of radio.

Sub-audible Tone Encode/Decode

Most repeaters in areas with many repeaters (such as metropolitan areas), require a specific sub-audible tone (below the normal audio range) in order to retransmit the incoming signal. These tones, also known as CTCSS or by Motorola's term, PL (Private Line) tones, typically range from 67 Hz to around 250 Hz. To transmit through these repeaters, one must have a radio that generates a subaudible tone while the PTT (push to talk) button is depressed. In densely populated areas, more than one repeater may be heard on any given frequency. By assigning a different PL tone to each repeater, users can select the repeater through which they wish to transmit, thereby directing their signal to a particular geographic area.

Similarly, if the radio has PL decode, also known as tone squelch, the user will hear only the desired repeater rather than all the repeaters on the frequency. (Editor's note: This is true as long as the repeater controller either passes the tone from the transmitting station-many do not-or the repeater transmits its own tone on its transmitter-many don't). While PL is supposed to eliminate interference, in reality, it masks the problem, but the result is generally more pleasant for the users. PL decode is useful when using your radio around a computer. Many stores now use computerized cash registers and many homes now have computers. Computers generate a great deal of radio frequency hash. PL decode will keep your radio squelched until the desired repeater comes on the air. Not having the squelch open any time one is near some locally generated interference, is much more pleasant.

External DC Connection

Most HTs come with an internal rechargeable battery, so why would you want an external DC connection on the radio? At some point, the HT battery will need recharging. While mobile with the HT, it is very convenient to be able to use the car's twelve-volt battery. Similarly, for emergency work that may require keeping the radio operational all day or for several days at a time, one will need a supply of rechargeable battery packs, an AA battery pack, or an external DC connection capability.

Ideally, the radio should transmit at full power when powered from an external source, such as a car's accessory socket. It's better if the HT can be connected directly (through a fuse) to the car's 12-volt socket and work properly. Less desirable are the models that require a voltage converter to drop or condition the voltage to match the radio's design voltage. While this voltage converter will power the radio, the user is required to purchase another item from the HT manufacturer, which adds to the total purchase cost for the radio.

12-volt gel cells are readily available either new or at flea markets. I use a fused 12-volt gel cell, which I carry in a camera pouch on my belt, with a cable that plugs into my HT. This battery can power my HT at a full 5 watts all day during public service events, leaving the internal rechargeable battery at full charge for later use. If I need to be operational for several days, I can use this same cable to connect to any 12-volt source.

AA Pack

During many natural disasters, local 117VAC house power is not available to recharge the internal HT battery. Most HT manufacturers make a case that holds several AA size alkaline cells to keep your radio on the air during these times. Alkaline AA cells have a multi-year shelf life. Keep a quantity of these AA cells available and rotate them through flashlights, MP3 players, and other electronic equipment so there is always fresh stock for emergencies.

Ideally, the number of batteries in the HT case, multiplied by 1.5V, should equal the voltage needed for full-power output from the transmitter. To keep this pack small, the manufacturer may provide space for only two or four AA cells, which will generally produce much less than full power output from your HT. Consider a radio that has an AA pack with sufficient cells to provide full power. If you buy a radio that does not produce full power with its AA pack, consider buying an accessory pack so you can stay on the air when you can't recharge your internal HT battery.

Illuminated Frequency & Keypad

At night or in low-light conditions, it is very helpful to be able to press a button and have the dial and keypad light up. While emergency drills are usually scheduled for daylight hours, real emergencies can occur day or night. Whether you are just changing from one pre-programmed channel to the next or actually entering a new frequency, PL, and offset into the HT, being able to see what you are doing is very helpful. But use the light only when needed, in order to conserve battery power.

Repeater Reverse Button

Most FM VHF/UHF operation is through a repeater. The Reverse button changes the HT's transmit frequency to the repeater's output and listens on the repeater's input. This function can be important in emergencies when a repeater goes down, as it enables communication between hams using that repeater. It can also be used to listen for hams who do not have, or know how to use, the proper PL tone. Without PL, their signals may not be retransmitted through the repeater. One way to hear them, if they are close enough to you, is to press the Reverse button. Then, you will then be listening on the repeater's input.

Easy-to-Understand User's Manual

Even with years of experience as a ham radio operator and as the owner of many models of HTs, I still inadvertently hit a button on the keypad of my current HT that puts the radio in a mode that I don't normally use. Unless one has an easy-to-understand manual handy, it can be frustrating trying to get the radio back to normal operation. For a new ham, this could be a souring experience. Of course, having read the manual cover-to-cover at least once (so you will recognize what mode your radio is in), and keeping the manual handy is always a good idea.

Unfortunately, people whose second language is English have written some user's manuals. The sentence structure in the manual makes perfect sense in their native language but results in a confusing English sentence. What to do? Before you purchase a radio, read parts of the user's manual and try following the instructions. Many HT manufacturers provide downloadable copies of their manuals on-line. Look up the instructions for inputting a repeater frequency, PL, repeater offset, and for storing this information in a memory slot. Try doing

this on a friend's radio or at the radio store where you are considering buying the radio. Then try the radio on the air. If the radio brings up the local repeater, the manual was clear enough for you.

If you really like the radio, but the manual is less than optimum, check out Users' Groups on-line, or with your local ham club or CERT group. Someone who has figured out how to make that particular radio work may have rewritten parts of the user's manual in plain, simple, English.

***Nifty!* Mini-Manual™ Users Guide**

This company publishes waterproof, spiral-bound quick reference guides written in plain English for most of the current Ham Radio models. They typically sell for under \$20 and are available on-line or from your favorite Ham Radio dealer.

Memory Slots

Some simple radios come with a few dozen memory slots, which are fine for local communication, but lacks flexibility for emergencies and general listening. Those memory slots will probably be sufficient for ARES/RACES/ACS (Amateur Radio Emergency Service) / (Radio Amateur Civil Emergency Service) / (Auxiliary Communications Service) and CERT support in your local area. However, one does not want to have to erase a favorite local repeater in order to program in a repeater used for a bike-athon or similar event. I find that, in addition to ham radio frequencies, I like to be able to program in several of my local weather channels, which are generally found in the 162.4 MHz range. When I travel, I program in the repeater frequencies for the area I'm going to. (This is also a reason to use programming software where you can create a file for enroute and destination frequencies.) In addition to listening to weather, many hams like to monitor the aircraft band, which many 2-meter HTs can also cover. Adding aircraft channels takes more memory. Additionally some Police and Fire departments still use conventional VHF and UHF radio channels that can be received on many HTs. Most radios today provide between 100 and 400 memory slots or more, but some low end, or older and/or smaller HTs don't.

Robust Antenna Connector

Unfortunately, the antenna connector on most small modern HTs is an SMA. This type of connector is generally fine if all you are doing is using the HT with the supplied 6-8" long rubber-duckie antenna. The base of the rubber duckie antenna should be about 5/8 inch in diameter to spread the torque load of the antenna to the HT case. The range of a 5-Watt HT is greatly extended by connecting the HT to an outside antenna positioned in the center of a car roof or on the roof of your home. The downside of this is the strain placed on the very small center pin of the SMA connector and the case if the radio. Many hams that do this regularly have found that they have broken the rubber-duckie center pin or the connection inside the radio.

When in the field, I frequently attach a 1/4 wave or 5/8-wave whip antenna to my HT to greatly increase my usable range. This type of antenna puts a lot of torque on the small SMA antenna connector and may cause the wire going from the connector to the radio's circuit board to break off. There are spaghetti whips that provide more gain than the rubber duckie antenna and put less stress on the SMA connector.

Years ago, when HTs were larger and came with BNC connectors that could take any type of antenna without damaging the HT, I got used to disconnecting the supplied HT antenna and connecting my mobile magnetic mount two-meter antenna. Other things being equal, a radio with a BNC connector will give fewer problems if you plan to connect different antennas to your HT. You may be stuck with an SMA connector, as that is the current design on most of the new, smaller HTs. Just be aware of the potential difficulties if you plan to connect an external antenna to an HT with an SMA antenna connector. If you plan to use a Magnetic Antenna or other external antenna, you need to use an SMA adapter to fit the connector that is attached to the end of your coax cable. I recommend that use a flexible adapter.... One that is on a short (12 to 36 inch) cable. Do not use a rigid one. Doing so can literally snap the top of your radio off if it suddenly gets bumped, caught or flexed.

External Earphone/ Speaker Jack

Most HTs have adequate volume for inside a house or in a relatively quiet outside environment. However, outside on a busy street, the audio from the HT's speaker may be marginal. I have found that plugging an external earphone into my HT has prevented me from missing important calls. In addition, using an earphone keeps the radio from disturbing people nearby. Some external Speaker/Microphones (speaker mic) have an earphone jack on them.

Optional characteristics— External microphone jack

Some people prefer to leave the HT on their belts or velcro'ed to their dashboard and use an external speaker/mic. If you think this applies to you, look for a radio that also provides a jack for connecting an external microphone. In terms of priorities, I'd rank this one high.

Things to Avoid

Not Operationally Intuitive

This is a difficult topic. Most radios are not *Operationally Intuitive* to a beginner. Terms are strange, features are confusing and there is this steep learning curve. Owners manuals seem to be written in Greek. After owning radios made by ICOM, Kenwood, Alinco, and Yaesu over the years, I have been able to pick up some models of those manufacturers and figure out the basics just by looking at the labels on the buttons. Some of what I consider intuitive may be based on my experience and the fact that at one time the basic programming operation of a manufacturer's new radio was very similar to their prior models. It may be that the first radio you try will seem confusing, the second one less so, and by the third radio, you may be getting used to the typical programming procedure. To see if this is happening to you, after looking at several models, go back to the first radio and give it another chance.

One Watt Output or Less

Some radios are so small that the battery pack will support only one watt of RF output. Other even smaller radios put out only 300 milliwatts, or 1/3rd of a watt. These are great radios for operation close in to a repeater location, but are marginal for communications when a repeater may not be available, or even for simplex operation in hilly terrain. Depending upon elevation and terrain, even one watt may not permit reliable communications on simplex in your area.

No External Antenna Connection

A good antenna helps by extending both an HT's transmit range and the HT's ability to receive signals. Rubber-duckie antennas are a compromise in favor of small size, but are not very efficient antennas. Avoid radios that do not have an external antenna connector unless you plan to use the radio only for monitoring the local repeater.

Other Considerations

How Many Bands?

Most communities rely on either or both, the 2-meter and 440 MHz (70 centimeter) ham band for emergency communications. Some HTs are designed to cover any two of three bands at a time, such as 2 meters, 70 cm, and 6 meters, or 2 meters, 70 cm and the 1.25 cm (222 MHz) band. The most popular HTs are "Dual-Band" radios the cover 2 meters and 440 MHz and that's what you should plan on getting.

Some multiband radios can monitor two frequencies in the same band or one frequency in each of two bands but most all radios have a scan feature that allows you to monitor multiple channels no matter which band they're on.

General Coverage vs. Ham Band Only

Many HTs available today will cover not only the desired ham band but also adjacent frequencies, such as some public safety, aircraft, weather and FRS. Being able to pick up the local weather in the 162.4 MHz range is a plus.

Some of the more complex radios will cover the AM broadcast band up through commercial FM. Some will also receive SSB (single sideband) and CW (Morse code) transmissions. These are nice features, but sensitivity and selectivity on an HT will be inferior to the performance of a communications receiver.

Price

At this writing, good quality, Dual Band HTs cost as little as \$30 for a “Little Chinese Radio (LCR) or as much as \$500 with some of the latest bells and whistles such as GPS and Bluetooth. But typically a quality name brand dual-bander runs around \$200-\$250.

What do you do when you decide you need more capability in an HT? Fortunately, there will always be Hams looking for a bargain when buying an HT. If you wish to upgrade in a few years, there is a good market for used radios.

Conclusion

I have discussed HT features that I consider important in choosing your first HT to give you some things to look for when trying to decide what to buy. The two primary Ham Radio magazines, QST and CQ, often have comparative articles on popular radios. But no matter how you address which radio to buy, you might look for the recommendation of the person you might turn to for help.