

How do I?

An occasional series

This week: Making the leap to HF. Creating a base station

Let's assume you are reading this article in the **How Do I...?** series because you studied hard, successfully passed the Technician licensing exam, and maybe you even took a shot at the General Class licensing exam. Congratulations!

At this point I imagine you are just itching to get an HF transmitter on the air and make some contacts. HF (High Frequency) commonly is defined as 160 meters to 10 meters. Purists will categorize the Amateur Radio 160 meter band as MF (Medium Frequency). Most of the common general purpose radios on the market cover 160 meters to 10 meters. Some also include 6 meters.

Some transceivers may not include 60 meters. Sixty meters is an odd band. The hobby shares it with government users. There are restrictions on mode, signal width, frequency, even geography restrictions that make it perhaps the least used amateur radio band. As a result, we will not discuss 60 meters in much detail. Perhaps another day.

Before you rush out to buy or borrow a radio, give some thought to the following topics:

1. **Location.**

Where am I going to physically locate my station? Here in the northeast, basements seem to be a fairly popular spot. One reason is that you have easy access to your cold water pipes to use for station grounding. Attics, especially in split level homes where the attic is typically more a part of the second floor, are also popular. Others use a bedroom as a ham radio shack. Or with the advancements in computers, tablets, cell phones and blue tooth, I know people who have the radio someplace out of the way, maybe in a closet, and the ham radio station is their favorite recliner in the living room where they use their computer tablet and Wi-Fi to interface with the radio. In warm-weather Florida it seems common to wall off part of the garage/car-port to use for the radio room.

No matter where you locate your ham radio station you will need:

- " a desk or work table;
- " a comfortable chair;
- " good lighting;
- " at least one 20 amp circuit and multiple 15 amp circuits.
- " Someday you may wish to have a 220 volt AC circuit if an RF power amplifier is part of your plans.

2. Antenna System.

Realistically, you want the best antenna system you can get. But every antenna is a compromise. You may dream of a stacked yagi beam system on a 100 foot tower, then realize you have a 1/5 acre lot. Not going to work. For some, the best antenna they can use is one of the MFJ apartment antennas+. It is a whip that mounts on a balcony railing. Some reviewers have calculated this type of antenna is about 5% efficient, meaning whatever amount of power (watts) your transmitter produces, just 5% of that power makes its way out of the antenna. If that is the best your station configuration can do, that is fine . no worries. At least you are on the air! Just keep in mind that the kilowatt amplifier in your dreams will not safely work with that type of antenna.

Many books have been written on antennas. The ARRL *Handbook* has many designs that you can build yourself. You will most likely need to buy parts, but you do not have to buy an antenna. For most folks though, buying a pre-made antenna, whether it is a simple and popular G5RV wire antenna, or the popular Carolina Windom wire antenna, or a Butternut, Comet or Hustler vertical antenna, or some beam antenna with a rotator on a 30ft tower, takes some of the guesswork out of the process. Such an antenna may cost \$300 or more, but if you have to buy all the component parts, plus an antenna analyzer, plus some tools to assemble it, you will not save any money making your own. But making antennas has always been popular and that has drawn some newcomers into the hobby.

How many watts of power do you plan to operate with? A typical ham radio transceiver is rated for 100 watts RF output. By adding an amplifier you may be able to transmit up to the legal limit of 1500 watts RF output.

Some antennas and their feed lines can handle whatever RF power you give them. Some coaxial cables, and some antenna designs have lower limits, such as 100 or 200 watts. Look at the whole picture before you introduce an amplifier into your ham radio station. When you do your homework you will find that the AC Power demanded by an amplifier is likely to increase and may exceed the

capacity of your house wiring. Additionally, you will need to conduct an RF Exposure Evaluation. The results of that evaluation may affect your choice of antennas and their installation location.

How do you get feed lines into (or out of) the ham radio shack? One popular way is to install a window pass-through. You can buy one from MFJ <https://www.mfjenterprises.com> or build your own with a piece of 1x4 or 2x4 lumber and connectors from someone like QuicksilverRadio <https://www.qsradio.com>. Other hams drill holes in their walls or route feedline cables through a door or window frame.

3. Radio Transmitter and Receiver (or Transceiver)

Just to list all the options would be an entire article and we'd still miss some. Historically beginners have bought ~~used~~ or ~~entry~~ level radios. Then after gaining some experience they move up to an ~~advanced~~ transceiver. Back in the 1950s the typical ham radio station had a separate transmitter and receiver. Starting sometime in the 1960s the transceiver, which put both functions in a single case, became fairly standard. Some radios, today very few, include a power supply. For most the power supply is an add-on feature. One reason for this is it makes it easier to sell the same transceiver in many different countries, as the radio only cares that it has 13.8 volts DC.

Entry-class radios, such as the Icom 718, are good, solid radios. They have fewer features, but also fewer knobs, buttons and pages in the user manual. I started with an Icom 718 and still like it, even though I have upgraded twice. The Yaesu FT450D is another great rig. It has been modified a few times, and I believe the current version has more bells and whistles than the Icom 718. Kenwood makes some excellent radios but nothing that says ~~beginner~~ like the Icom 718.

If you want to step up, you have a lot more choices. For this list, I am only including rigs still in production. Depending on your budget, and these radios are all within a couple hundred dollars of each other, the Kenwood TS590SG, TS2000, Yaesu FT3000DX, Yaesu FT991A and the Icom 7300 are all ~~equal~~. Some can do more than others. The TS2000 is getting a little long in the tooth and may be retired soon as Kenwood revamps their lineup. All have some sort of USB-to-computer interface so that you can control the rig functions via a PC. Most also have built-in sound cards so you can experiment with digital modes such as FT8, PSK31, and RTTY. If your radio does not have its own built-in sound card, the Signalink USB from Tigertronics plays well with practically all radios when configured with the corresponding interface cable.

Not sure which radio you want? Don't feel bad. I shopped for at least 5 years before I bought an HF rig. One of the best ways to shop is to go to a local club's Field Day event held the fourth full weekend in June. See what they are using, and talk to the members. The more you know, and the more brands/models of radios you get a chance to operate, the better informed you will be.

Used radios. Writers may say something like "Many new hams find a good used radio at a hamfest." That can be true. But I have been to hamfests where there were very few radios, or even none, that I'd really want. For me, for a first ever radio, I'd try to buy new, or try to buy a good used one from a reputable new equipment dealer. Ham Radio Outlet (HRO) (www.hamradio.com) often has used radios they have accepted as trade-ins, or "open box" specials that can be even better values. I have bought used equipment from HRO and trust them. DX Engineering (<https://www.dxengineering.com/>) also has some good values at times, but generally do not have the depth of selection in used equipment compared to HRO. If you want to save a few dollars, your local hamfest, the classified ads on eHam.net and similar sites may have the radio you want.

Your local ham radio club may be the good source. It is a fact of life that club members age and eventually become silent keys. Other club members may be forced to downsize as they progress into personal care or nursing homes. They may have excellent radios, and other station accessories sitting idle, in great condition, at really good prices.

When buying used equipment, the world can be your oyster. Anything from 1950s through 1970s tube rigs (known as "boat anchors" to some) to the hybrid solid state and tube rigs of the 70s and 80s, to the entirely solid state rigs of the 1990s and beyond. Look at the reviews on eHam.net. Just about every radio has been reviewed by someone.

As I write this article, eHam has 4,150 classified ads posted on their website. At least 300 ads are listed in HF radios. Buying used can have the benefit of getting extra stuff. For example, a new Yaesu 897D might have sold for \$900. The antenna tuner may have added another \$200, the Signalink adds \$100, a Heil headset adds \$200. But the used equipment seller may bundle all of that, and more, for a selling price of \$800 or so.

New or used, buy from a seller you trust. That may be as close as one of your fellow club members.

4. Power Supply

You will need a power supply to transform the typical 110 volt AC household current into the 13.8 volt DC current your radio wants. Icom, Yaesu, Alinco, Kenwood, Daiwa, MFJ, Samlex, and others all sell power supplies. I own several Samlex power supplies and have never had an issue. I also use a Yaesu power supply, which ironically enough spent most of its career powering an Icom radio. I also own an MFJ supply and know others who like theirs. If I was to buy another power supply I think I'd get a Daiwa or an Alinco just because they look cool. You really cannot go wrong with any of the above brands.

You will need to determine what size power supply . measured in amps -- to purchase. Most HF transceivers of the type you are likely to purchase consume 20 to 25 amps on the DC side when transmitting. You will need a power supply rated accordingly.

5. Feedline and other accessories

Your antenna needs a feed line. Coaxial cable can be expensive, but do not skimp. Read the specs in the HRO and DX Engineering catalogs and within reason, get the best quality you can afford. You will want an SWR meter. Most SWR meters also serve as an RF power meter. A good SWR/Power meter can help establish a baseline for normal performance. In turn, the SWR/Power meter can reveal and help diagnose problems. Most radios sold these days have this meter built-in and selectable from a front-panel button.

At some point you probably will want an antenna analyzer as well.

Depending on your operating interests, you may want to upgrade the microphone that came with the radio to a desk mic or a boom mic headset. The radio manufacturer itself, Heil Sound, and MFJ all make desk mics and boom mic headsets. I prefer a headset, but that is just me.

An external speaker may be beneficial as well. Some are simply speakers, some have additional digital signal processing (DSP) built-in to remove noise and improve your listening experience. An external speaker has the added advantage of being directionally aimable so that it faces you . the Operator. In contrast, the speaker built into the radio itself probably is oriented in a fixed direction that isn't facing you.

Depending on the radio you purchased, you may need additional interfaces or cables to connect the radio to a personal computer for rig control and sound

card functionality.

Conclusion:

Enjoy your new HF station and your Amateur Radio operating privileges. Technician license holders have phone privileges on the HF 10 meter band.

Propagation on the Ten Meter Band can be hit or miss. Some days and times the band is open. You can make long distance contacts under those conditions. Some days and times the band is not open and you will hear nothing on this band. You won't know until you try.

The Cumberland Amateur Radio Club 10 meter net meets on 28.400 MHz Upper Sideband at 8 PM each Wednesday evening. This is a good place to start using those well-deserved privileges. I invite you to check-in.

Catch ya on the air!