Brass Tacks

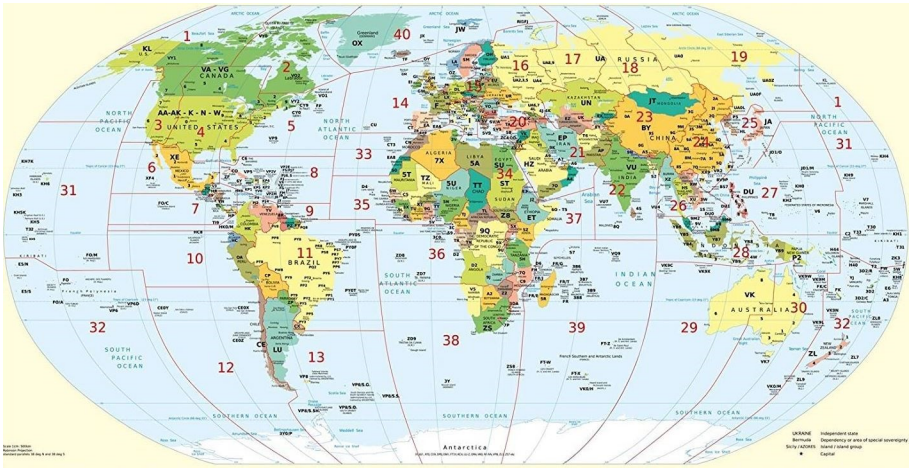
An in-depth look at a radio-related topic

Getting started with DXing

While it's fun and often practical to talk with friends locally on repeaters, one of the reasons you might have gotten into amateur radio was to communicate with somebody far away, even across the Earth. Whether for preparedness or for the hobby, global communication not using a commercial infrastructure is one of the hallmarks of amateur radio. We refer to the far reach of radio signals as ***DX***, which is short for *distance*, or in our context, *long-distance*. As a follow-on colloquialism, we therefore refer to the activity of engaging in long-distance communication as ***DXing*** or *working DX*. Let's divide the discussion into two parts: **equipment** and **operation**.

Equipment for DXing

Hams across the globe have been able to work DX using QRP (5 watts) to legal limit (1500 watts) and every power level in between. They've also been able to make valid DX contacts using the poorest rain gutter downspouts to the most monstrous beam. In spite of all the possibilities, let's focus on some points that I believe will bring you the greatest success at chasing DX, especially if you're relatively new to the game.



100-watt rig

As far as your transceiver is concerned, I recommend that you start out with a *solid-state* unit that can output 100 watts. Will tube and lower-power transceivers work? Of course, but the object here is to make it as painless as possible for you, the beginner DXer, to get started. Also, if your rig has a built-in tuner, a power meter, attenuator, a band-pass filter, and simple split operation-handling, those are bonuses.

Some have turned to amplifiers, to get their signal out stronger and farther, and if you can afford one, feel free to use one. But unlike a new screwdriver, they do take a little getting used to, and typically have a learning curve. Furthermore, many find that the resulting change in signal reach or ability to be heard slightly better, doesn't always justify their cost. Many will tell you to invest in a better antenna instead, because it won't do much to help you receive better. Still, many others swear by them and report great successes in DXing with amplifiers.

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Vertical antenna with radials

If you stood on your roof, and looked out toward the horizon, it's easy to envision signals that you send from your antenna shooting skyward at, say, a 45-degree angle, refracting off the ionosphere, then landing in some remote location. It becomes obvious that sending signals from your antenna at a 40-degree angle upward from the horizon might reach a little farther than the first signals you envisioned. In fact, you're soon aware that you want your signal to be aimed as close (low) to the horizon as possible, so that it refracts off the ionosphere as far away as possible. Your antenna will radiate signals all around it, but the angle above the horizon, of the strongest signal from your antenna is called the *takeoff angle of radiation*, or simply, the ***takeoff angle***.

It would be nice to have a low-takeoff angle Yagi beam on a tower at your disposal, and the ability to rotate it toward the direction of the strongest signal. But, if you're poor, like most of us, you might need to settle for something less, yet that can still work DX from your location. I recommend erecting a ***vertical antenna***, to give you a low takeoff angle, but it comes at the price of a *greater noise level*.

And whether you ground-mount your vertical or roof-mount it, I also recommend you install radials for it, whether or not the manufacturer states that their antenna requires them. Keep in mind that if the antenna does not require radials, it means the designer has calculated the element lengths or coil impedances to provide the best match without radials, likely requiring you to adjust element lengths accordingly, or use a tuner, or both.

If possible, install two symmetric pairs of radials per band, each the length of a quarter-wave for the lowest band. For example, if I'm installing radials for a four-band vertical, the lowest band of which is 80 meters, I would lay out two pairs per band times four bands, equals sixteen radials of 234 ÷ 3.5 MHz = 67 feet each. Most of us don't have the real estate to lay out sixteen 67-foot radials, so we compromise and cut them short or bend them at an angle where we need to. And if you aren't able to lay out the pairs perfectly symmetrical, just do the best you can.

Other antennas, such as magnetic loops, end-feds, and hex beams have worked well to some degree for many DXers. The secret to many of their successes is *height*, such that typically, the higher you can mount an antenna element, the lower the takeoff angle. But location can be equally important, especially if you're transmitting from wet, marshy soil (ideal), or trying to get your signal out of a narrow, dry canyon (not so much).

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In an effort to squeeze out every ounce of power from their rigs through their antennas, many DXers will tell you to use an extra low-loss feed line, such as ladder line. In all practicality, however, you can still enjoy quite a lot of success using coaxial cable, provided you use lower-loss coax, such as LMR-400 or RG-213. Ladder line can be tricky, and easily couples with nearby conductive objects, altering its characteristic impedance, a problem not normally encountered with coaxial cable.

Once you've had a few years of DX success, feel free to experiment with lower power, amplifiers, other kinds of antennas, and see what works for you. Then, tell the rest of us about your successes, so we can learn from your experience. No matter your antenna or feed line setup, however, I recommend that you always ***use a tuner*** to protect your transceiver from an extra-heavy current draw due to low feed line impedance.

Operating for DXing

A DX location is typically one that is outside one's own country; however, for contesting, award, and spotting purposes, the term *DX* has developed a rather loose definition over the years. Today, most locations outside the US are still considered DX to Americans, but that includes Hawaii, and often Alaska, yet DX typically does not include Canada or Mexico. That being said, when hams begin venturing into DXing, they tend to hope for exotic contacts in transoceanic lands.

With that goal in mind, then, DXing for us means making contacts with hams across the waters. With a Technician class license, you can enjoy DXing on a section of the 10-meter band using SSB (single sideband) during favorable sunspot periods, or the 80-meter and 40-meter bands using CW. But to enjoy making SSB contacts on all bands, you'll need to upgrade to a General class license. And since our focus is on getting started, our concentration is on SSB.

Amateur radio operation for DX is not quite the same as operating on a local repeater. You're attempting to communicate, possibly across the globe, with somebody whose native language might not be English, and whose operating customs and habits might be quite different from those of a friend you might contact across town. In fact, it takes some practice to get it all right, but we can break down the experience by two activities: ***calling*** for a contact, and ***answering*** somebody who's calling out for a contact.

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Answering DX

When seeking a DX contact, first select a band for the time of day you're targeting, then check propagation forecasts for that band, by using online software such as VOACAP. You can also check online spotting software such as DXSummit, for international amateurs that are being reported by American hams, if you're an American station. Still, you can simply go for broke, shoot from the hip, and a few other cliches for randomly spinning the big dial and surprising yourself by what's out there.

Listen carefully for a station calling CQ, maybe with an international accent, or a hollow or fluttery sound, possibly caused by multiple hops of the signal. If you hear a pileup, but don't hear the calling station, try using the WebSDR to listen for the DXer, then answer the ham on your transceiver, if it becomes apparent that he or she really is calling from a DX location.

Listen for the word ***split*** or the phrase *listening up*, in case the calling station is transmitting on one frequency and listening on another. If the calling station states "listening up 5," it means they're listening on a frequency that's 5 kHz higher than the one they transmitted on, and so you need to transmit on that higher frequency. For example, you're tuned to 7.180 MHz, and hear the DX station say "listening up 10," it means you must transmit on 7.190 MHz to have the DX station hear you. Most modern HF rigs have a built-in method of performing split operation by using two VFOs, in which you set the split difference in kHz, then simply enable the function. After that, your transmissions will be on one frequency, while your reception will be on another, just like you were communication through a repeater.

Take note of the ***exchange*** between the calling station and the respondents, and determine whether they're casual conversations or rapid successions of signal reports. If you're American, and you find that the calling station is also American (because of the call sign) calling ***CQDX***, be sure not to answer that one, because they're asking for only DX stations (outside the US) to respond.

Also listen for *restrictions*, such as "Europe only," which tells all but European stations to stand by. Sometimes they restrict the contacts to your call sign digit, by saying, "7 only" or "4 stations." Be sensitive to those restrictions. Then, when it's your turn, simply state your call sign phonetically, slowly, and clearly, and nothing else.

Once you've established contact, talk with the DX station as you would normally talk with any other, or simply give them the exchange, whichever you had determined by listening to his CQ, or by how others responded. If the DX station only expects the rapid exchange, don't try to engage them in conversation, but make your exchange loud, clear, and concise. Finally, ***log the contact*** in your favorite log book, but be sure to also log it in QRZ.com, so that when people look up your call sign, they can also see the list of DX contacts you've made.

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Calling for DX

When you're looking to call out for a DX contact, prepare the same way as when answering, by making sure nobody is on the frequency you're targeting. Listen on the WebSDR for amateurs, then ask on the air whether the frequency is in use. Select a frequency on a whole number of kilohertz, such as 7.191 MHz or 14.228 MHz, rather than 7.1913. If possible, select a frequency that's a whole number multiple of 5 kilohertz, such as 7.190 MHz or 14.225 MHz. Request a signal report, not so much to hear about your signal strength (S7 or S9 for example), but to make sure you're not calling out with a garbled, raspy, or otherwise compromised signal.

Begin calling either CQ or CQDX, understanding that if you call CQ, any ham is allowed to answer you. If you're an American ham, and you find you're only getting contacts from American stations, then use CQDX instead. Once again, log the contact in your favorite log book, but be sure to also log it in QRZ.com, so that when people look up your call sign, they can view the list of DX contacts you've made.

Day and night

During daylight hours, your greatest likelihood for DX contacts will be using the 20-meter, 17-meter, 15-meter, 12-meter, and 10-meter bands, during months of high sunspot activity. Just before sunrise, 20-meter DX signals first appear from the east, followed by 17-meter DX stations, and so forth. Then, just after sunset, 10-meter DX signals start disappearing, followed by 12-meter stations, and so on. The band(s) that will actually be usable during daylight can often be predicted by the ***MUF*** (maximum usable frequency), the highest frequency that the ionosphere can support for DX at your location.

At nighttime, DX communication is much more likely using the 30-meter, 40-meter, 60-meter, 80-meter, and 160-meter bands, since their signals are largely absorbed by the ionospheric D-layer during the day. Starting late afternoon, those DX stations of the 30-meter and 40-meter bands start making their appearance, followed by the rest right about at sunset. Then, DX signals on the 160-meter and 80-meter bands disappear rapidly right at dawn, with the rest of the nighttime bands following soon afterwards.

Summary

Working DX can be a fun, if not thrilling, adventure, and is the reason many get involved with amateur radio. As long as your equipment can be used on HF, you can work DX, but start out with a 100-watt rig and a solid antenna, for a positive DXing experience. Whether you're calling for DX or listening to answer a DX station, it's an art that often takes patience and a little experience, to get right. Then, log that contact! If you'd like more info on DXing, try using this comprehensive guide by one of our own club members, Bryce Anderson K7UA. Now, have fun!

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