

Newcomers and Elmers Net: Moving into HF and a General License

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Moving into HF is more than just gaining new operating privileges, although that is one of the significant benefits, of course! With HF you are in essence required to learn more about how radio works.

- Even the most simplistic station capable of HF operation requires at the least knowledge of how to operate an HF radio and how to set up an antenna which will work for the bands you want to operate
- An HF rig is much more complicated, and capable, than an VHF/UHF rig, even the fancy ones!
- Field Day is a perfect example of this in that while an HF rig can be set for a particular band and antenna combination, the minute you switch bands you have new settings to choose and an antenna to tune
- Just the idea of tuning an antenna as you switch between bands is mostly foreign to VHF/UHF operation unless you have an unusual setup
- Unless you have added 6 or 10-meter operation to your arsenal of bands, you have probably not experienced retuning your antenna, or even operated on anything other than FM mode
- As a Tech you have studied a bit about carriers, sidebands and modulation modes, but it is mostly just theory
- When you move into HF you start using that knowledge to craft signals, to bend radio to your will to accomplish your communication goals
- Even if you got into the hobby just for Public Service/Emergency services work, you will find HF is going to figure prominently in future public service work with digital modes, traffic handling, regional communication etc.
- As a Tech you think in terms of repeaters and linking repeaters for distance operation, or simplex for very close-in communication
- With HF you are thinking in terms of shaping, bending, directing signals to work close-in, to circumnavigate the world, and everything in-between
- One of the major differences between distance in VHF/UHF and HF is you are the reason a signal reaches out to California or to Hong Kong, not the repeater
- The closest we get to this feeling in VHF/UHF is when we operate SSB skip on 2-meters or 440 MHz, or if we play in the Magic band, 6-meters or the occasional 10-meter opening

- One of the most exciting feelings as an Amateur Radio operator to me is realizing a signal from my little backyard antenna farm has reached out to someone in China, Antarctica, Greenland, Iceland, Siberia, New Zealand, Japan, India, South Africa – I have talked with people in every one of those countries and more as a Ham.
- I have reached every continent in the world from my little backyard modest amateur station in Bellevue population-next-to-nothing KY
- It's a similar feeling to the one I used to get as a kid (and still do to this day) listening to shortwave radio, amazed at what I could hear sitting in my room with a radio and a wire running outside tied to tree

As you advance to General, you'll gain a deeper understanding of the signals you use to communicate. The methods of constructing transmitters and receivers are also covered. You'll be able to communicate more effectively as a result.

One of the topics covered by the general license is reading/interpreting circuit diagrams

- This is part of learning how things work and work together
- Learning about stages of signals, what happens when they enter a radio and what happens as they are manipulated through analog or digital circuits helps us understand what is happening inside the radio
- Understanding more about what is happening inside the radio helps us learn more about controlling the signal and getting more out of our equipment
- This can also lead to building our own equipment. However basic or advanced we want to become in our building skills
- As you learn about the parts of a radio and antenna system you start to learn about signal shapes and what influences the shape of signals
- You also learn about controlling those shapes so that our signals are pure and do not cause interference for others, as well as being the best readable signals we can send

When you get into HF you learn about many different types of modulation

- This weekend as various people came into the digital station it was interesting to hear various levels of experience as signals were identified by their sound or by their shape on the waterfall
- CW, RTTY, PSK31, JT65 and JT9, Olivia, Hellschreiber, AMTOR, PACTOR, MFSK32, Throb, Contestia and more.
- There are portions of the HF bands where amateurs send pictures back and forth, some of them in HD-type resolution using some of the newest digital slow-scan TV software

- Folks still operate AM in portions of bands agreed upon by convention – if you haven't heard quality AM amateur radio transmissions you are missing a treat! Great audio quality!
- Folks are even experimenting with Digital Voice on HF, similar to what you hear through D-Star or System Fusion or DMR, but on HF and without the need for repeaters or the Internet (or expensive equipment!)

With HF you can take your hobby and easily integrate it into your lifestyle

- Operating mobile when walking, driving, camping, boating, climbing, vacationing, bicycling, backpacking or just lounging in a log cabin out in the woods somewhere
- You don't need a lot of expensive equipment or high power, in fact the more you get away from civilization the less power you need and the less complicated your antenna needs to be
- A little elevation and a low noise environment means you can hear and be heard easily
- And if operating from home, there is always a way to get on the air as we have discussed numerous times on the net, even if you should keep your radios and antennas hidden!

When you get into HF you will also learn more about dealing with interference

- In VHF/UHF the frequencies are high enough not too much interferes; it can happen, but it is certainly more rare
- With HF you learn ways to deal with interference your system may cause, or more commonly, you learn how to deal with interference caused by others
- This is part and parcel of learning about your system, what is happening inside the radio and other equipment you own, and how signals work
- You become a bit of a detective in seeking out sources of interference and then you put on your doctor's hat as you learn how to heal your patient by removing the interference as best you can
- You will even learn more about antennas and filters as you look to minimize the effects of interference or just crowding on a band when working during a contest weekend

And let's not forget about propagation, or learning how signals get from one place to another

- In VHF/UHF work we talk in terms of line-of-sight propagation, which is fairly simple, really
- There are also special propagation conditions which allow us to work beyond line of sight, but these are special situations and certainly not the norm. We rarely think of them until we experience one
- With HF we are always thinking about propagation in one form or another
- Whether it is in our antenna choices, band choices, locations we want to work, or trying to figure out why our signal is not getting through, wave propagation is at the heart of HF operation
- These last 6 months of working weak signal modes has taught me more about propagation than almost any other source
- As they say in the science world, there is theory and then there is praxis, or experience. There is what we think we should expect, and then there is what we actually get
- Some of the long believed and often repeated “facts” of propagation are getting reshaped and re-defined as we learn more about how signals travel through the air
- Reciprocity is one of those theories which is accepted as common knowledge: the way an antenna transmits, its radiation pattern, is the same way it receives
- I am not questioning the scientific validity of reciprocity – it is proven scientific fact
- But what is not true is the definition of reciprocity commonly held by amateurs than what they hear they can work
- Practical testing, and especially when using weak-signal software, shows this is definitely not the case; things happen up in the air, strange things, magical things, scary things, which can cause my signal to suddenly disappear! (Okay, not really scary things, but it sounded more dramatic that way, didn't it!)
- And then there is the shift in propagation which can cause a signal to go from being strong to barely copy able from one minute to the next, literally, and back again
- To borrow from Shakespeare's *Hamlet*, “There are more things between heaven and earth, Horatio, than are dreamt of in your propagation theories”
- And don't forget solar propagation and how it affects our signals here on earth!

There are also experimental bands you can play with in HF that, while accessible to all, are underused

- 30 meters and 60 meters are two such bands, both with limitations, but both with a lot of potential
- 30 meters is limited to digital modes, meaning no phone or voice modulation
- Lots of room for experimenting with different modes, and placed in the spectrum between the best all-year band, 40 meters, and the best DX band year-round, 20 meters
- It is amazing how few people are on this band generally
- 60 meters is more limited in terms of frequencies, at least until we are not restricted to specific frequencies, but again it is an interesting band placed between two popular and active bands
- When we add in our soon-to-be assessible LF and VLF frequencies, there is all kinds of new areas in which to play

And of course, Antennas

- Perhaps more than any other area of the hobby, antennas are the most important but often least understood of the elements of a radio station
- This is due partly because there are many ready-made options to get us on the air quickly with HF
- This isn't a bad thing, necessarily, but we need to get on the air and also learn about how antennas work
- No antenna can do it all well; every antenna is a compromise of sorts, some more than others
- Much of what we learn over time in the hobby is how to work within those compromises, or how to exploits the strengths of one design over another to fit our particular needs
- We also find rarely is one antenna enough!
- Whether we build our own or buy commercial products, working in HF forces you to learn more about antennas and even how they should be erected
- For the person trying to better and better results out of their station, there will be a natural progression of trying out different antennas, adding antennas, or working through challenges to get a better signal
- Along the way we will gain valuable knowledge about what works and what does not, and hopefully why
- And we will learn how to take advantage of various antenna designs to work certain bands, or certain styles of operation, like NVIS operation or long-path DXing

We often say in Amateur Radio that our license is a license to learn. This is definitely true with the General license

- Many of the topics covered here tonight are way beyond what the General Class license book can teach you
- You get basics, hints, previews of what you will learn as a General, but no book can cover all of these topics adequately, and there will be a hundred more you come up with on your own as you gain experience as a ham
- This is my tenth year as an amateur radio and I feel like I have only scratched the surface in some areas, and there is much more to learn
- This isn't meant to sound overwhelming by any means; quite the opposite in fact, meaning there is a lifetime of enjoyment to be had in the hobby as you explore new areas of the hobby
- And who knows what new things are just around the corner? Amateur radio is barely 100 yrs. old, and look how far we have come!
- Some of our Elmers in various groups and clubs have been around for nearly half of those 100 years or more! Just ask them how often things have changed
- And speaking of Elmers, as a General you can become a Volunteer Examiner, helping with Tech classes and licensing