

Ham Radio for Preppers

An Introduction

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Introduction

I am not a Prepper. I am a ham, and have been one for over 50 years. Additionally, I have worked in radio, electronics, and eventually computers for that whole time. I suppose it was because of that background that I was asked to provide some information for Preppers on communications and ham radio. I'll assume that if you are reading this, you are a Prepper. Hopefully, you will find this info useful.

As I see it, Prepping is about being ready to survive a disaster. The main strategy is typically about setting up a situation in which the Prepper or a group of Preppers will be able to hunker down in safety until the disaster situation passes. That is a perfectly reasonable.

Looking at the hunker down strategy as someone with a radio communications background, I hope that it includes adequate consideration for radio monitoring and communications. Radio would be the Prepper's main tool for keeping track of what is going on beyond what you can see around you. Having two way radio communications capability provides a way to request help or information from others without leaving your shelter area.

Ham radio often comes to mind as a possibility for dealing with radio communications concerns. That then triggers questions about the costs, personal effort needed, and specific capabilities of ham radio. Unfortunately, few people outside the ham radio community know enough about that radio service to answer those questions.

What is Amateur Radio?

Let's start with the question "What is ham radio?" The term "Ham" is actually a slang label for a licensed operator in the Amateur Radio Service. This is an official service licensed and regulated in the U.S.A. by the Federal Communications Commission (FCC). Don't be put off by the label "Amateur." The Amateur part of the name means "not for pay". Many hams are experts at radio technology and operation. When you obtain an Amateur Radio license, you will receive an official license certificate and listing in the FCC license database.

The Amateur Radio service is unique when compared with all other radio services covered by FCC regulations. An Amateur Radio license is both an individual operator license and a station license. An Amateur Radio operator (or “ham” if you prefer) may establish a communications radio station and use it without prior notice to the FCC. The ham is solely responsible for his operating practices and equipment performance. As long as his equipment and operation meet minimum regulatory and engineering standards, he will not be bothered by the FCC.

Those minimum standards allow great latitude for individual ham uses. A ham may build his/her equipment, adapt equipment from other services, or buy ham specific equipment. A ham may operate on a wide range of radio frequencies that provide local, regional, and worldwide communications capabilities. Transmitter power levels up to 1.5 KW are allowed.

In other radio services it is the transmitter that is licensed, not the operator. The transmitter must be type-accepted for the service it will be used in and set up to operate only on a specifically licensed frequency or set of channels. Amateur Radio transmitters are not type accepted. In fact, you can use anything you want as long as the radio frequency signal you feed to your antenna meets the standards mentioned above and remains within allowed ham frequency bands.

What can a Prepper do with Amateur Radio?

Amateur Radio is a licensed communications service. The range of technologies used covers the full range of modern communications. The kinds of operation range from the technological research to disaster communications to mundane person to person chatting.

Amateur Radio encompasses a wide range of communications modes and methods. A range of frequencies is available that encompass local, regional, and worldwide capabilities. While Morse code (CW) transmissions are still used, voice and digital communications modes are much more common. Modern digital communications modes typically use connections between a transceiver’s microphone and speaker connections to a PC computer’s sound card earphone and microphone ports. Software is used to transmit reliable text messages with signals so far below the background radio noise level that a human ear does not detect them. Even limited e-mail service is available through free services on ham frequencies.

Most people in the developed world today have become dependent upon modern technologies like cell phones, the internet, and high speed digital services of all types. If the world goes to crap around you, guess what goes first – the high tech stuff. For a Prepper, by far the greatest value of Amateur Radio is for gaining knowledge and experience in radio communications technology and operation. Knowing how to communicate in spite of high tech infrastructure breakdown may be critical.

There is a very active Prepper ham community around the country, and even in other parts of the world. They meet on prearranged frequencies and at prearranged times. These networks of Preppers exchange ideas and assist each other with signal reports for station performance evaluation. Joining one or more of these networks provides important experience in understanding radio equipment

and signal propagation. They also get on the air to just chat even when there is nothing important going on.

Another aspect of radio communications worth considering is keeping in touch with other Preppers and the outside world is to be able to know when it is safe to leave your shelter. You do not want to be like those poor Japanese soldiers who hid out on Pacific islands for many years after the Second World War. They did not know the war had ended. You need to stay informed.

Isn't the Government Listening?

Within the Prepper community there is often found a distrust of government agencies. With Amateur Radio an official FCC licensed service and openly published operating times and frequencies, won't the Gumm't be listening? Well, that's not at all likely. What goes on in the ham operating frequencies is mostly ignored. At most, hams acting as Official Observers casually tune around watching for rule violations such as not identifying your station properly or operating on an incorrect frequency. If a violation is noticed by one of these hams, he will drop a post card in the mail to remind you of the rule you broke.

There are a couple factors that make monitoring ham radio operation difficult for government agencies. First, hams are not assigned specific operating frequencies. The Amateur Radio service is assigned ranges or bands of frequencies for operation. That means there is the equivalent of an infinite number of "channels" to for anyone attempting to monitor ham transmissions. Second, how far a radio signal travels and where it can be heard depends upon many of factors including sun spot activity, time of day, time of year, thunder storm activity (radio noise), and so on.

Actually, there is a very real problem with Amateur Radio operation is that it can be difficult for an inexperienced radio operator to attract enough attention with a radio to get help when needed. Simply transmitting on some random frequency in one of the ham operating bands will not be noticed by government agencies and maybe not even by other hams. To be noticed, someone in receiving range of your signal must be listening on or tuning his receiver past your frequency when you are transmitting. Experience helps out to understand which frequencies and which times are best for contacting other stations.

If Nobody Is Listening, Why Do I Need A License?

Why get a license if nobody is listening? Why not just buy a radio, store it until it is needed and just start using it? All the rules go out the window then don't they? Well, there is a problem with that idea.

The concept of using Amateur Radio for communications in a disaster situation is about knowing how and what to do to communicate and even how others will be attempting to communicate. It takes study and experience to achieve that.

Studying for and passing the test for an Amateur Radio license is a good idea for anyone interested in radio communications. Along with questions about regulations, safety, and operating procedures, the subjects covered includes basic electronics and radio technology. Getting a license and gaining actual on-the-air experience provides the training necessary to become competent with radio communications technology and practices.

Though there is little government monitoring of ham operating frequencies, operating without a license is a poor idea. The Amateur Radio service is, for the most part, self regulating. Hams are vigilant and ready to work to shut down or move unlicensed and non-ham stations off ham assigned frequencies. Incursion by groups looking to avoid commercial licensing cost sometimes attempt to use ham equipment on ham frequencies for their business operation. You will find this negative attitude toward intruders in the Prepper ham community too.

With a ham license, you will find that hams will assist you in improving your skill and knowledge at radio communications. This is both on and off the air. Besides, getting a ham license is not particularly hard. A few hours of book study is usually sufficient.

What Does It Take To Get An Amateur Radio License?

Obtaining an Amateur Radio license is straightforward. You study. You take a multiple choice test or two in front of hams who are Accredited Volunteer FCC Examiners. Both the test questions and answers are published for public review and study. Morse code is no longer needed for a ham license. There are many groups of ham examiners around the country. Finding one is usually just a matter of asking a local ham.

The study material is available both on the web and in books available from the American Radio Relay League (ARRL). The ARRL is the primary non-government Amateur Radio group. Among their many activities is an Amateur Radio book publishing business. The ARRL sells licensing study guides.

There are three license classes: Technician, General, and Amateur Extra. While some people are happy stopping with just Technician class license, for Prepper purposes you should consider it a beginners license. That class of license has major operating frequency limitations. I would recommend continuing on to the General class license. The General class license includes almost all Amateur Radio frequency and power privileges. What is especially important is the General class access to the ham high frequency bands (1.8 to 29.7 Megahertz) that allow regional and worldwide station to station communications.

How Much Does It Cost?

It costs \$15 to take an Amateur Radio exam. But I am guessing that is not the cost you are interested in. You probably want to know how much the equipment costs. A deluxe station setup would cost several thousand dollars. I would, however, recommend more modest equipment. One redeeming feature in new ham transceivers is that even the least expensive new one is a very capable

unit. A no frills emergency communications installation for worldwide coverage will cost \$1500 or less with careful and knowledgeable shopping.

For Preppers, I would recommend you avoid buying used transceivers to reduce your costs. The problem you will encounter is that used gear is often overpriced and obsolete. By obsolete, I mean that repair parts may not be available if it breaks down. It is easy to find gear that is over 20 old that is still functional. Manufacturers do not maintain replacement part stock for more than a few years past a radio model's last manufacture date. You need equipment that is at the start of its useful life, not near the end.

Another issue will be of concern to the Prepper community is equipment power requirements. Most modern ham transceivers are designed to operate at 100 Watts transmitter output power. This power level is somewhat arbitrary but appropriate for general ham use. This transmit power in combination with normal ham antennas and noise conditions on the shortwave (HF) ham bands generally provides a comfortably receivable signal to other stations. The power supply requirements are compatible with most automobile and truck electrical systems. Inexpensive power supply units are available for operation from 120 VAC utility power.

100 watts requires about 20 Amps peak for full power transmit from a 12 VDC power source. (13.8 Volts actually) But of course, you are interested in communications when commercial power is no longer available. Even when not transmitting, these transceivers often draw around 1 Amp when turned on. There is ham equipment with lower power requirements and is compatible with very modest solar panel installations. Unfortunately, to achieve low power draw, transmitter power is greatly reduced. Reduced transmit power requires extra experience and skill.

Starting out with low power is very likely to be frustrating and discouraging. I recommend starting with a 100 watt transceiver. Add a 5 or 10 watt low power unit once you have gained experience operating the higher power rig. Keep your high power rig available for situations where low transmit power does not do the job.

Equipment Price

For a price reference, I checked the current (early 2013) new equipment list at Ham Radio Outlet, just one among several reliable stores to order from. This example is a no-frills setup but it is still as capable as most ham station installations in operation today.

- Transceiver: Icom IC-718 100 Watts, 0.03 MHz to 30 MHz - \$750
- Power Supply: MFJ-4125 13.8 VDC, 25 Amps - \$85
- Coax Cable Jumper: HRO8X/6U - \$20
- Antenna Tuner: MFJ-941E - \$130
- Antenna Cable: HRO8X/100U 50 Ohms, 100 ft - \$70
- Antenna: Alpha-Delta DX-CC 80 through 10 meter dipole - \$160

Total price for that is just over \$1200.

(Note: A good low power transceiver costs more than the IC-718)

For local communications, you could add VHF FM operation:

- VHF Transceiver: Kenwood TM-281A 65 Watts Mobile or Base - \$160
- Antenna: Arrow Antenna OSJ-146/440 - \$38
- Antenna Cable: HRO8X/25U 50 Ohms, 25 ft - \$33

That brings the total up to a bit over \$1400.

As you can see, the cost of a no-frills but adequate communications installation is not out of line with regular consumer grade electronic items.

What Can These Radios Do?

You might be wondering what these radios can do. They are small and light. The Icom IC-718 is a Single Side Band (SSB) transceiver that puts out 100 Watts. Most hams don't use any more power than that to talk to places all over the globe. (How well and how often depends upon ionospheric conditions but that is true regardless of the power level.) For regional communications, out to 300 miles or so, that power is adequate for full time coverage.

The IC-718 is an entry level transceiver. It is inexpensive and has few of the bells and whistles found on more expensive equipment. Fortunately, radio technology has advanced to where even this transceiver's basic performance is better than needed for general ham use. The transmitter section generates a clean, high quality signal. The receiver section not only operates on ham frequencies but on all frequencies from 30 KHz to 30 MHz. This range covers all the shortwave broadcast bands, military and government frequencies, and even the AM broadcast band. To cut the description short, the IC-718 is more than adequate for a Prepper communications station.

You may have noticed that I included a device called an Antenna Tuner. This is a device used to protect the transmitter section of the transceiver and improve its performance. It is a characteristic of all modern communications transmitters that they are designed to produce their output power into a specific load impedance (50 Ohms). This is sort of like a stereo amplifier being designed for 8 Ohm speaker impedance. Quite a few antennas can be built to produce the correct load impedance for transmitters, but usually at just specific frequencies. You will, no doubt, not want to be limited as to which frequencies you can use by antenna limitations.

The Antenna Tuner connects between the transceiver and the coax transmission line to the antenna. The tuner has meters and adjustment knobs to allow you to correct any antenna system mismatches. This device is both simple and easy to use. It has a very wide adjustment range allowing operation with just about any kind of antenna you hook to it. It is great for hooking up emergency rigged antennas.

Now as for VHF FM operation, I listed the Kenwood TM-281A but there are several other available with similar performance and at similar prices. These transceivers are similar in size and

performance to those that have been used in police and fire departments. In fact, this Kenwood is a public service radio with a ham style front panel installed. Ham gear differs from regular public service transceivers in that ham units have more controls to allow them to be programmed from the front panel. Public service gear requires special hardware and software to change their operating frequencies.

These VHF FM transceivers are designed for vehicle installation but are also used as base stations. Vehicle to vehicle coverage with these high powered transceivers is roughly 15 miles on flat ground. For base stations with elevated antennas and vehicles on mountain tops, line of site coverage in the hundreds of miles is possible. In hilly terrain, coverage is spotty.

How hams work around range limitations with VHF FM units is to set up radio relays called repeaters. These repeaters are set up with their antennas on high towers with long views in all directions. How they work is by having a receiver tuned to one frequency and a transmitter tuned to another. What it hears with its receiver is fed to its transmitter. Anyone transmitting on the repeaters receiver frequency and listening on its transmitter frequency can talk with any else doing the same even though they might not be able to hear each other directly. There is a tremendous number of repeaters around the country and most are open for general use. Many have provisions of emergency power.

What about Antennas?

You may have noticed that the antenna listed above is not very expensive. That is because it is mostly wire that you unroll and stretch out about 30 feet off the ground. Though simple, this antenna is very effective. It is ideal for regional communications, out to 300 miles or so, but still performs well on frequencies used for greater distances.

What is usually a surprise to newcomers to radio communications is that simple wire antennas work as well as more complex and expensive antenna types. Even very large ham antenna installations with tall towers and large directional antennas include additional wire antennas. Learning how to quickly and easily fabricate and install wire antennas is a very valuable skill for Preppers.

Probably the most important point about antennas is that you should not rush out and buy expensive commercial antennas thinking they will outperform anything you can make yourself. Homemade wire antennas can and do work well. I listed a commercially made wire antenna above merely to simplify an initial installation. Once you become skilled at building wire antennas, you would spend your antenna money at a hardware store buying wire, rope, and other hardware.

The VHF FM antenna is a simple vertical rod arrangement that mounts at the top of a pipe or pole. This particular model is extremely rugged and its performance is as good as any costing several times its price. It is vertical to match up with the whip antennas used on vehicles for VHF FM operation.

What Is It Like To Operate An Amateur Radio Station?

Operating an Amateur Radio station is probably different from you might expect. First off, forget everything you have seen in movies or on TV about ham radio. Screen portrayals of ham radio operation are usually filmed and edited by folks who know little or nothing about this radio service. You will not turn on your ham transceiver and hear a distress call from Ice Station Zebra requesting rescue from a huge Polar Bear attack or anything similar. Nope, ham radio operation is much more mundane than that.

What do hams talk about when they are on the air talking to other hams? Actually, nothing important – most of the time. What you are most likely to hear on the ham bands would be just ordinary folks chatting about radio gear, the weather, their health issues, and just about anything else you can think of. You might wonder what the point of Amateur Radio is if that is all that is going on.

As described above, hams build their own radio installations, buying or building equipment and antennas. Most are changing or experimenting with different settings on their gear or trying different antenna configurations. Getting on the air and talking to other hams is how they find out how well their stations are working. What they are talking about is usually less important to the hams than how well the equipment is performing under varying ionospheric conditions and at different distances.

Those seemingly random conversations you will hear on ham radio frequencies are part of how hams become proficient at setting up and operating radio gear in emergency situations. Nothing beats practice for getting good at something. In radio, that means trying different station configuration ideas and talking to other stations to find out what works.

OK, But It's Not Only About Amateur Radio

So far I only discussed Amateur Radio. There is another aspect to this subject for Preppers. There is a whole lot more to radio. Amateur Radio is the training ground for understanding non-ham aspects of radio communications. Hams, Military, Police, Commercial, Broadcast, and all other radio services operate in the same radio environment and with the same physical constraints. Experience operating ham transmitting equipment on ham frequencies provides practical knowledge of how these other agencies chose their frequencies and times for communications.

The tools for monitoring these non-ham transmissions are a good shortwave receiver and a good 'police' scanner. Fortunately, ham transceivers like the Icom IC-718 mentioned above make excellent shortwave receivers. They are very sensitive and accurate. One of the more interesting things that can be done is listen to short wave broadcast signals from other countries. Every country has its own slant on what is happening in the world. A fairly accurate picture of the world situation can be gleaned from the contents of a few different foreign new broadcasts.

The Kenwood TM-281 mobile VHF FM transceiver makes a good VHF analog scanner. However, there have been some changes that reduce its usefulness for general scanner use. Many areas of the country are transitioning from familiar analog transmissions to digital trunking systems. A modern

digital trunking scanner such as the Uniden BCD996XT scanner (or its hand held equivalent, the BCD396XT) is needed to receive these signals.

Conclusion

For those interested in keeping track of what is going on in the world, knowing how to find out is a good first step. I hope I have conveyed that there is more to using a radio than turning it on and spinning the dial. All it takes is a little study and some practice to have a window on the world. There is no better way to gain the necessary skill than with Amateur Radio.