HF Antennas for Emergency Communications by Dale Carlile KA7HDA

An antenna, an antenna, who needs an antenna?

An antenna, an antenna, oh you can just use anything conductive, it will work just fine.

An antenna, an antenna, the right one for the situation and conditions makes all of the difference in the world.

An antenna radiates radio waves (electromechanical energy) into space and collects it from space. The real issue is will it do so effectively when you need it, on a frequency that is usable?

Emergency communications and non-emergency communications are identical! They both use radio waves. The difference is that most emergency communications occurs under very difficult conditions. Often these conditions require one to rely on a Mc Giever or Rube Goldberg style solution. I intend to only focus on HF antennas for emergencies when fixed stations may not have a standing antenna or must be evacuated for some reason.

There are many theories, beliefs, and old Ham tales about antennas. Many are pure hot air, others have value, and some are very dangerous. I believe that safety is our first priority. So right out of the chute, antennas that expose you or others to RF at unsafe levels or to physical injury are potentially deadly! Period! Nuff Said?

Over the years, I have been involved in many situations requiring an antenna that could be quickly deployed, would be reliable, was very portable and most importantly that worked. My antenna of choice is the lowly dipole. Now stop snickering and think for a minute. A dipole is inexpensive, is easily built, and is almost 100% efficient. It can be mounted or supported in many ways and in almost any location. Now remember in an emergency you might be dropped on a mountaintop by a chopper or find yourself amid a pile of rubble that was once your city. Either way you need something that will work, go up fast, and go up by unskilled hands. So let us explore this further.

We have several ham bands to choose from. They all have different characteristics and we can argue until the horses come in as to which band is the best choice or we can choose to agree on past experience and choose the 40 and 80 meter bands for HF. Why 40 and 80? Because they work! 80 meters is used at night while 40 is your daytime band. Think about it, when are the bands open? The other reason in the propagation, they will bounce back to earth close to you.

The other reasons, well it comes down to reliable and effective, easily set up, and easy to fabricate. Not to mention inexpensive too. Most of you learned about propagation studying for your license. You learned that a dipole transmits at right angles to the wire, or in an oval if

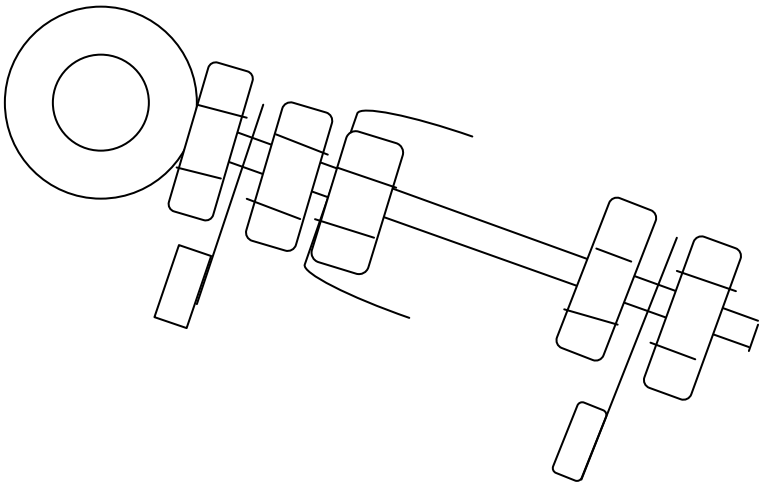
mounted as an inverted vee. While this is true, it can also be used as a cloud warmer; An antenna that radiates straight up.

Now just wait a minute, I know that there is nobody up there to talk to, but the signal sent straight up comes back down. It comes down in a near circular pattern too. This is important because the higher your antenna, the more garbage it sees. We really do not need interference from thunderstorms, weak signals, electrical noise, etc. We need a good signal that will reach just far enough to be heard outside of our local area. We may also need to communicate with someone on the backside of a local mountain range too. Last I checked radio waves do not penetrate mountains very well. Therefore, we need to take advantage of NVIS or cloud warming antennas to jump over the hill.

Our goal is to reach outside of our local area for help, not the other side of the world. NVIS will give us a usable area of about 300 to 700 miles in diameter. It is also less susceptible to interference than many other styles of antennas. I like that; it is very hard to get a clean copy amid electrical crashes from lightning storms. Yes even storms several hundred or a thousand miles away can ruin communications.

So let's look at building a dual band antenna for Encomm. Materials could be scavenged after the emergency or you could build it now and put it in your go kit. I prefer the latter. I like a broadband antenna, but they tend to be bulky and harder to erect. So lets start basic.

Insulators can be created from PVC pipe or from wood or you can use commercially available ones. I like PVC. For the center insulator I start with a large 4-way fitting. I place a short 2 inch long piece of pipe into 3 of the openings. Next I drill a hole in 3 pipe caps for a ¼ inch eyebolt. My assembly then consists of a nut, a wire lug connection and a nut threaded all of the way onto two of the eyebolts. The bolt is inserted into the pipe cap from the outside. Then I use a flat washer and a nylon lock nut to secure the bolt. Lastly, another nut, wire lug and nut. As shown below. Sorry no CAD program.



You need two of these and one with just the locking nut and washer to hold the bolt into the cap. I use solder wick from the lug to the antenna wire and from the lug to a SO-239 coax connector. I insulate the center conductor connection on the coax fitting.

I use the third eyebolt as a support. The pipe caps are glued to the cross connection. The last opening is the hard one. I mount the SO-239 connector inside of a pipe cap with small bolts. I solder the braid to the center connection and to a small lug that is under a bolt head. This cap is then glued to the last opening of the cross connector.

End insulators are 2 pipe caps and a short piece of pipe with an eye bolt through each of the caps. Use a long enough section of pipe to avoid the bolt ends being too close together. I use nylon rope to support my antennas.

Next are the wire elements. You will need two for each band. They will be connected to the center insulator's braid after being secured to the eyebolt by several wraps. Now how do you use it.

The best deployment is when you can mount it between 10 and 20 feet above the ground. The elements should form an x. Yes, I know that there are those that say to mount it 2 feet off the ground. Have you ever suffered an RF burn or tripped in the dark? In reality, you lose signal strength, about 4db, compared to the same antenna at 20 feet. Remember you may only have a low power transmitter running on batteries and every bit of signal will be needed.

Because an antenna in close proximity to the ground is affected by this proximity it is best to test your antenna and adjust its length before an emergency. I also believe that an inexpensive low end antenna tuner should be in every go kit. One it allows you to load up an old electric fence or compensate for a detuned dipole. When all else fails, an antenna tuner will let you load up almost any conductor you can scrounge; a flagpole or even a rain gutter or the preverbal bedsprings.

A great source of antenna wire is an old motor rewind shop. They often have enameled copper on an old wooden spool that they will sell cheap. I bought one 20 plus years ago and am still trying to use it up. It is square wire not round, but it works and is a #10 size.

Field day is coming; it is a wonderful time to use a home brew antenna.