

The Elmers Corner: There are No Real Antenna Shortcuts

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Like most radio folks I have at times wanted to take shortcuts with my antennas for the sake of convenience. One or two guy ropes instead of three; depending on a tuner to "get me in the ballpark" in terms of resonance; using "good enough" coax because the better stuff costs so much, and so on. You get the idea.

Sometimes the old ways are the best ways. Sometimes, "tried and true" can't really be improved upon! I will explore some of these tried-and-true antenna basics which have gotten lost in the blaze and glory of so-called technological advancements, in hopes of bettering our lives through simplicity.

Feeding Multiband Antennas

A multiband antenna may be necessary based on one's logistics, and there is certainly nothing wrong with them, but are you willing to go the extra mile to make sure the antenna is set up properly, from design to support structure to feedline? Multiband antennas can have a number of compromises, so any shortcuts taken can lead to big problems down the road.

Multiband antennas by their nature have to sacrifice some efficiency since antennas can only be truly resonant on one frequency at a time, but this does not mean they cannot be used. They do require more attention to detail than a monoband dipole, for example, but this is to be expected since you are getting more out of the antenna.

One of the places where shortcuts are most common is in the feedline. Coax feedlines are as ubiquitous in amateur radio these days as cell phones in an airport. Coax is quick and easy to install, and promises of low-loss construction are inviting. When coupled with a tuner in the shack the world seems to be a beautiful place, especially if the tuner is one of the computer-controlled push-of-the-button kind. A series of clicks, some buzzing, and a satisfying mellifluous tone, and we are off to the races!

But what is happening inside the coax as the signal traverses down this magical mass of metal? On multiband antennas our old nemesis *impedance* rears its ugly head. Capacitive reactance and inductive reactance must be cancelled out leaving only resistance for our antenna to be resonant. Anything else means there is additional resistance to the signal in the form of reflected power.

A tuner in the shack matches impedance at the radio so that the radio “sees” the impedance it needs to send full power output. Impedance changes with frequency, and there is also insertion loss (the cumulative effects of coax imperfections and signal attenuation).

Furthermore, the match between the tuner and the radio only exists between the cable which attaches your tuner to your radio. The coax between your tuner and the antenna represents higher losses, particularly as you move away from the antenna’s resonant frequency.

A good, old-fashioned option is to use ladder line for the feedline, even for runs under 100 feet. “What’s that?” you ask? “I thought short runs of coax had minimal losses?”

While good quality coax losses seem insignificant under this length, remember the issue is impedance added by the antenna not being cut to resonance. Even with a tuner coax losses can be significant for non-resonant frequencies. The losses for ladder line are so minimal that the losses will be negligible even at different frequencies. (By the way, a common misconception is that ladder line radiates signals, but this is not true if the antenna wires are balanced, viz. the same length and in the same plane with the feedline at 90°.)

Using a balanced tuner at the station with ladder line means most of your power will actually make it to the multiband antenna, and non-resonant bands will work better.

A common practice with ladder line is to twist it one turn every few feet to prevent effects from wind and to reduce strain on the ladder line. This will in no way affect the signal going out (or coming in).

Feedlines can be susceptible to RF coming back into the shack (but so can coax). Use a length of feedline which is **not** a half-wave multiple of the desired bands. A common length is 43’ or 86’. It can have conductive issues unless you are careful to keep it away from other metal surfaces. A typical rule of thumb is to maintain a distance of twice the width of the feedline from metal objects. This is not really hard, as any non-conductive material can be used as a spacer. PVC pipe works well.

Antenna Supports

Antennas are fragile in the big scheme of things. I wish I could put up one of those mighty self-sustaining towers, but I live where those are not allowed. Probably a good thing, too. I heard an old-timer comment on the air the

other day "The bigger the antenna the bigger the problems." I reflected on that for a few moments to appreciate the wisdom.

The best part about a 60' tower with a larger beam antenna is that the antenna is up 60' and should reach out and touch someone! The worst part about the antenna is that it is 60' up in the air when something goes wrong. A friend of mine had a malfunctioning beam 60' up in the air and it took several months for him to be able to fix it due to weather conditions and the need to find a tower climber.

I had a 32' wire antenna on a mast which was damaged by wind, and within a day or two I was able to get it up and working again. There is something to be said for simplicity! However, pride cometh before a fall, and lest you think I am being prideful, I must hasten to add my antenna came down because it only had two guy wires instead of three or four. A silly mistake, but one which I will not soon forget.

Over the years I have had several antennas taken down by strong wind because I took shortcuts with their supports. The most recent casualty was a 6-meter antenna which did indeed have three guy wires supporting it, but needed three more near the top of the antenna.

Three to four guy ropes are a minimum to limit movement in any direction, but sometimes two or more sets of these guy ropes need to be in place to minimize movement. If you are using fiberglass poles as I have done in the past, keep in mind these can get brittle over time through exposure to the elements, and therefore need to be protected from flexing as much as possible.

We routinely have 30-40 mph winds here, with gusts up to 50+ mph at times. Most of my antennas are quite solid even in these winds, but a few antennas I "threw" up in haste or with inadequate guying support have been the ones to come down.

These are just a few shortcuts to avoid – I am sure we will revisit the topic down the road! Hopefully you can avoid some of my foolish shortcuts and be able to enjoy the hobby all the more. And maybe, just maybe, we can share our mistakes with each other so we all benefit!

73, Robert