

# What It Takes to Build a Contest Station

Ham radio contests consist of signals on the air, and you can't have a signal without a station. How do contest stations get built? From an engineering or construction perspective, that's a very straightforward question that many *NCJ* articles have addressed. But, for many contesters, especially younger and newer contesters, the challenge isn't so much procuring and installing the Yagis, towers, and radios. It's also arranging your life, your relationships, and even your job in such a way that building a contest station is even possible. And, of course, finding a piece of land where you can make it happen.

Not all contesters build stations of their own; some very famous and capable contesters have spent their entire contesting careers as guest operators. My time in contesting has certainly included a lot of guest operating, but in a profession that has prompted several moves over the years, I've usually managed to put up a tower or two wherever I've landed. In Albuquerque, New Mexico, for example, I installed an 89-foot crank-up tower with a 2 element 40 meter Yagi and a KT34XA tribander, while in Lewes, Delaware, it was wires and whatever else I could put up in the trees.

I'd like to share some reflections and observations on the tradeoffs and compromises that went into making a couple of my stations happen. Perhaps you'll find my experiences useful as you think about your own ambitions and frustrations.

## Why I'm a Station Builder

I have always been fascinated (at least since I was 11) by the challenges involved in transmitting and receiving radio signals. This led to a Novice license when I was 12 and to the Novice Roundup not long after. I was hooked on contesting, but not just on the operating; it was the whole experience — the equipment, setup, planning, and antennas. This interest played a big role in my career. In turn, my career played a big role in my station building.

My affection for radio equipment led to a career that started out designing cell phones and other electronics. I love antennas, and trying to figure out what would work and why was a big part of a career twist and probably my most important patent covering cell phone duplexing. I liked thinking about the whole system and putting it together, and then never stopping the experimentation at trying to improve.

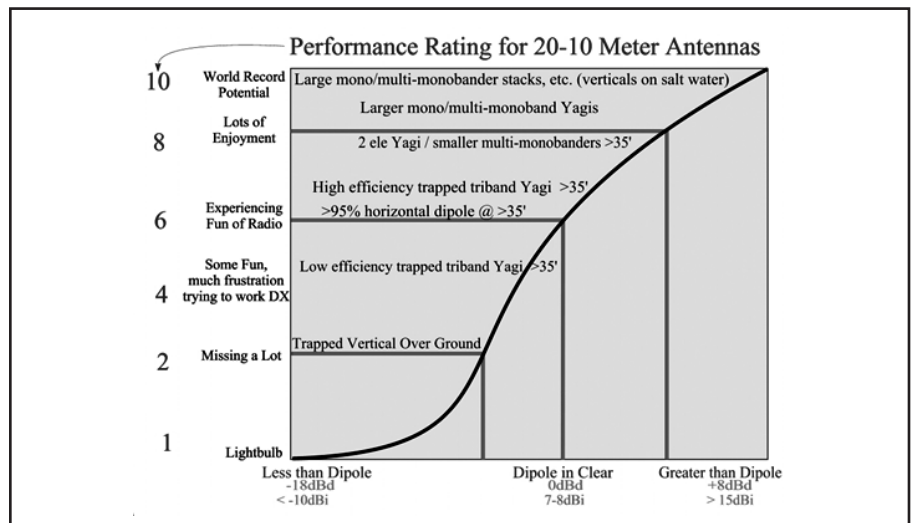


Figure 1 — The “array of light” chart from N6BT offers some insights into the tradeoffs between station design and contest performance. [Courtesy of Tom Schiller, N6BT]

Ham radio has been a big part of my life. There were always other things, of course, such as family, school, career, and sports that fought for priority with ham radio and often won. They never totally won, though, because I always figured out how to accommodate ham radio enough to have fun.

I've relocated a few times, so I have had to make a lot of choices, learning a lot in the process. I have also done a fair amount of multi/guest/DXpedition operating. I enjoyed those experiences, and it's great to operate at some sizeable stations and in nice locations, but they didn't satisfy my interest in building, developing, and operating from my own station. Some of my best memories of my Caribbean operations were more about developing the antenna system than the operating. I remember creating some excitement while operating ZF2KE on Grand Cayman for the ARRL DX CW with K9DX and K9HMB, when an elevated radial for a 40 meter antenna I put up caught a bush on fire in the middle of the night! Some of my best memories of VP5 were coming up with an inverted L for 160 that worked so much better than the existing inverted V, and putting up a 2 element vertical array for 40, made from two 33-foot MFJ telescoping fiberglass masts. This beat the 2 element 40 meter Yagi at 60 feet by a wide margin.

Between education, work, family, and radio there are a lot of interrelated deci-

sions to be made and priorities to set. I grew up and was first licensed in Delaware. Since then I put together satisfactory stations in Illinois, Indiana, New Mexico, and again in Illinois. My two locations since — in Perkasio, Pennsylvania, and Lewes, Delaware — represent very different scenarios, so I will use them as extreme examples.

## Building a Contest Station near Philadelphia

My move to Perkasio began with a transfer to the Home and Networks business in Motorola. The job was in Horsham, Pennsylvania, not too far from where I grew up in Wilmington, Delaware, so it was back to the East Coast after almost 35 years away. I was excited about finding a suitable location and building a decent single-op station. Since our son was in college, there was no need to be concerned about schools, a major factor in previous house hunting. This was going to be easy!

I knew I would be quite busy with work and travel, so I didn't want to be too far away, and my wife wanted a pretty new house. So, it seemed simple. We were looking for a new house, no covenants, high on a hill, a few acres, and close to everything. I wasn't in too much of a hurry, because I could just commute from Chicago to Philadelphia each week until we found something. I wasn't able to get any solid information on ham-friendly municipalities;

each township was different, and you just have to read the regulations, I was told. A call to W2GD helped a lot, because John climbed towers and had some ideas about where towers were already in place.

The house hunt was not so easy after all. We looked at houses for most of a year. Finally, after ruling out all the ones that were not new or that were at the bottom of the valley, right next to power lines, under tower restrictions, or too far away, nothing was left! We finally chose one that we'd looked at earlier and had scratched several times. It was on a nice little hill on 4 acres, was new, was in a township that had favorable antenna zoning, and was significantly less than we were planning to spend.

Unfortunately it was farther away from everything than we'd wanted, was sitting on an odd 150 × 1200 lot, was real close to a neighbor considering the 4-acre lot, had a height limit of 75 feet due to the narrow lot width, and was not really quite the style of house we had wanted. Even so, it was something I could work with, so we moved in November 2006, and I started planning and acquiring.

I didn't need a zoning variance, so I applied for a building permit. This ended up being more controversial than I expected. At first my neighbors were okay when I told them I was going to put up an antenna, but they didn't want me to apply for a permit, because they had all put up storage sheds and pole barns without getting permits and thought my application would bring attention to them. I told them my antenna would be up in the air and more visible than their buildings, so I didn't want to take any chances, and they reluctantly understood. It didn't turn out to be an issue anyway. The inspector barely looked at my tower, let alone their structures.

Getting the building permit took persistence. I'd reviewed the requirements and put together an application package, which I turned in to the township building code official. The administrative assistant told me the town would notify me when my application was approved. The next 6 months included one meeting after another, however, with each concluding that there was just "one remaining item." First it was that the plans were not wet sealed by a licensed mechanical engineer (I had used catalog drawings for the tower and guying).

Once I rectified that, it was a series of things that came out of nowhere, including a form on environmental impact of the removal and replacement of the soil for the tower and guy holes. I did a masterful job of filling out that one. After successfully jumping through more hoops, I reached what I thought was a successful conclusion. But — you knew there was a "but" coming, right? — just as the permit was

about to be issued the building code official said that he couldn't issue it, because of the possibility that I might put a cellular antenna on the tower. On the spot I drafted and signed a letter stating that there would be *no* cellular antennas on the tower. The permit was issued, and I was good to go! Being persistent and keeping under control paid off.

W2GD and W2RQ did all of the heavy lifting on the tower job while I was traveling. It was 86 feet of Rohn 45, guyed at 40 and 80 feet with C31XR's at 45 and 88 feet and a Force 12 Delta 240 at 100 feet. A few years later I added a second Delta 240 at 50 feet. That tower also later held up bent element 4 squares for 80 and 160, both tied off at about 80 feet.

I thought these antennas would work quite well from my new location, and I was happy with how they looked, but I don't think everyone was. While I never received any complaints, I did run into my nearest neighbor at a convenience store while getting coffee one morning. She told me that her father had been a ham. I was happy to hear about that, but then she told me that he'd never had any antennas like mine and asked me why the antenna had to be that large. I explained that my antenna was set up so I could do well in on-the-air competitions. "Well, from what I can see," she replied, "it looks like you won!" I thought that was fairly funny, but she didn't talk to me much after that.

The location and antenna did work quite well, helping me to earn several multi-single wins in the CQ WW, ARRL DX, and WAE, and some decent results in other events. Soon, however, due to family and work considerations, it once again was time to move on, this time to Delaware, the state in which I had my first station more than 40 years earlier.

### **An Invisible Contest Station in Southern Delaware**

My latest location is Lewes (pronounced like "Lewis"), Delaware, the first town in the First State and a combination historical and beach town that includes the oldest house in Delaware, built in 1665. My wife and I have enjoyed visiting Lewes since we moved back to the East Coast and started spending time at the beach. My wife has always wanted to live where we could walk to places like stores, coffee shops, and the beach. Lewes was just that kind of town. While those aspects also appealed to me, I did not like the ham radio implications that came along with them.

I noticed a neighborhood very close to town that bordered on about 40 acres of preserved woods. I told my wife and the realtor that if a house came on the market that backed onto the woods, I would be

interested. I figured I could sneak some wires out in the trees and have some fun. My back-up plan was buying a place in town and a separate place farther inland that was cheaper and free of restrictions, and building a remote.

In the spring of 2013, a place near the woods came on the market. It was a mess, but it was in the right location for trees and walking, and the price was right. We bought it and began redoing the house, tearing down walls, putting in a new kitchen and bathrooms, painting, carpeting — you name it, and we changed it. While the contractors were at work, I started looking into what sort of stealth antenna I could put up in the woods. I started with a 20 meter dipole and was reminded how well a dipole can perform. I put up the dipole with a sling shot but I later invested in an Air Boss Antenna Launcher, which was maybe the best \$50 I have ever spent in ham radio. Soon, antennas were going up high in the trees, including a 4 square for 80.

That antenna resulted in a USA #1 Single-Operator assisted win on 80 in the 2013 CQ WW CW. With that and some wires for the other bands I managed 2014 ARRL DX scores of 1.9 million points on SSB and 4.4 million on CW. Because I'm concerned about my antennas becoming an issue with neighbors or others, I am quite careful to keep them hidden. A lot of products are on the market for hunters to help them blend into the background while in the woods. I have used camouflage tape, fabric, rope, and paint. I have found that pine needles and leaves cover wires and cables on the ground rather quickly in the fall as they blow off the trees, so that's the time to route cables and lay radials. Vines also like to grow up the coax, making those cables even harder to see. Camo tape and fabric on switchboxes that are carefully placed make them seem to disappear.

The woods are fairly dense, so I don't think I'm too obvious when working back there, and I have not seen much evidence that people walk through them. Sometimes I need to go back and forth quite a bit, however, and am potentially visible to the neighbors. To allay any questions that might come my way, I procured a large camera. I haven't any time for or interest in taking pictures yet, but the camera provides a great cover story as it travels into the woods with me.

This year I am trying a few 2 element triband Yagis as an upgrade. Thanks to NE3F, AA1K, WB3IWC, and K3PH, I procured some old tribanders that were camo painted and reworked into 2 element tribanders on 7 or 8-foot booms. I also had a leftover C3S that I added into the mix. The elements straddle the tree trunks, so they can be pulled up into a few trees and set

for fixed directions. Fortunately many of my trees are pines that have no branches for the first 40 or 50 feet, so I can pull these antennas up to the bottom of the branches. I still have dipoles for comparison and testing, but these 2 element tribanders have proven to be a big step up. It would be nice to have bigger antennas, but 2 elements are lightweight and work out well with the trees. More important, they are better than what I had, and it's great to keep improving.

The book, *Array of Light*, by Tom Schiller, N6BT, is a great resource and contains a chart that I really like. Tom has graciously agreed to allow me to include it in this article. It shows 20 through 10 meter antennas covering the performance range between a light bulb and world-record potential antennas. A dipole greater than

35 feet high gets you to 'experiencing the fun of radio,' while a 2 element Yagi greater than 35 feet high produces "lots of enjoyment" and is most of the way to the best antennas. So it makes sense that these 2 element antennas would perform well and, based on my experience so far, they work as well as advertised.

### **Some Lessons Learned**

Through all of this I have learned and relearned a number of lessons. These include the need to

- be persistent with real estate, building, and zoning personnel.
- keep my eyes open for possibilities; this is how I found "my" woods.
- ask more questions, I really wish I would have asked more about the mean-

ing of "preserved" (it turned out to be a tax status that will probably be undone and the land developed).

I also rediscovered that you can do a lot with wire, including a hard-to-see 80 meter 4 square in the trees; a dipole is a very good antenna, and 2 elements are a big step up and most of the way there.

The story is far from over. With the inevitability of the woods disappearing and my wife already deciding that this house is way too big for the two of us, it is only a matter of time before I am off again to a new challenge. I am looking forward to it, but in the meantime I am still having fun coming up with ideas for making this location work better and, of course, keeping my eyes open for possibilities.