Glenn Johnson, WØGJ / w0gj@arrl.net

The Year of 53 Weeks: WØGJ Moves to Iowa

After 25 years in northern Minnesota for 25 years, moving to another state for a job change should be fairly simple, unless one has an antenna farm. When we moved to Bemidji in 1989, I initially had a single tower. We built a home, and a tower was part of the "antenna allowance" in the building financing. It was a Rohn 55G with a rotating base at 90 feet and two stacked TH-7s and a 3 element 40 meter beam at the top (150 feet), or about 170 feet above the lake we lived on.

When a Minnesota-based ham radio dealer went out of business a few years later, the TH-7s were replaced with a pair of 20 meter monobanders, and 15 meter and 10 meter monobanders. A new 4 element 40 meter beam went up on a separate 140 foot tower. The two TH-7s were put on a separate rotating Rohn 25G tower, spaced for maximum gain on 15. A single 160 meter vertical constructed with Rohn 25 and three 4-squares (80, 40, and 30) were added. And, some smaller towers with a single TH-7 and 6 meter beams. Yes, there was some haphazard planning, but things seemed to come together for a contest/DX station. The shack for many years was a pair of Icom IC-756PROIIs and various amplifiers.

A few years ago in Visalia, I heard a talk by Tom Taormina, K5RC, "Is 3 dB Worth a Divorce?" This summer, Tom completed the W7RN Comstock Memorial Station, **www.w7rn.com**, a project more than 6 years in the building. It includes 3/3 80 meter Yagis! There was a lot of common sense in Tom's talk about getting the most out of relatively simple improvements, where the point of diminishing returns begins to limit practicality.

I started working in Decorah, Iowa, in early 2010, working part time and commuting to/from Minnesota every 2 or 3 weeks. We decided to make the move permanent when we had an empty nest. And, as retirement approached, we wanted to downsize. During the commutes, I had a lot of time to think about planning a new station. We wanted a "good location," as every ham dreams of, but these are hard to find. For 2 years, we looked and found nothing.

One day, the retiring administrator of the clinic I worked at for dropped by my office and asked if I was still looking for a place. He and his wife had decided to sell and move to another state when he retired a couple of years hence. I went out to visit the site and couldn't believe what I saw. They lived in the middle of 68 acres atop the tallest hill in the area, with a commanding 360° view.

The Decorah area of Northeast Iowa is quite hilly and is the so-called "driftless area." The last glacial flow went *around* this area and didn't smooth it off. Also, "the hill" is on the rim of a giant 3.1 mile diameter meteor crater! The house is a 2007 ranch style, with everything we need on one level; perfect for when we get old and need wheelchairs. There is a walkout lower level with spare bedrooms; perfect for guest ops! We identified with the parable in the *Bible*, Matthew 13:44-46, where the man finds the perfect treasure in a field, and he sells everything he has to buy the field.

We took possession at the end of July 2012. In mid-August 2012, KC1XX and crew were in Minnesota, and we spent almost 3 days taking down all of the antennas and towers in Bemidji. During the third week of August, the moving van packed up our things, and we made the move from the ARRL Dakota Division to the Midwest Division. I was fortunate to have a ham in the Bemidji area willing to buy anything I wanted to part with. He took all of the HF antennas, except for my favorite M² 4 element 40 meter and 4 element SteppIR (206 meter) Yagis.

During 2 years of planning, my goals were (1) Have a competitive contest/DX station; (2) Keep it simple, and (3) Get that extra 3 dB (or so) without a divorce. This is my "retirement station," where I will spend my final years — with my first wife! Sounds easy, but the details are legion.

I wanted to minimize the loss of crop land, which we rent, preserve Mama's view from the main area of the home (this may be the top priority! If Mama isn't happy, no one is happy), set up a SO2R, MS, M2 station (no thought given to MM), provide easy access — shack to antennas, operators to sleeping rooms, etc. Further, I needed to keep everything modular for easy troubleshooting and for changeouts/upgrades, use my existing tower hardware, erect a main (run) tower and a multiplier tower, put up flexible, easy-to-use (and install) HF antennas, including a beam for 30 meters, one of my favorite bands, im-

Figure 1 — The main tower — a 165 foot rotating Rohn 55G with full-size M² 40 meter 40M4FS-125 at 156 feet with three 4 element SteppIRs at 112 feet, 76 feet (on TIC ring) and 40 feet. All guys are Phillystran. [Glenn Johnson, WØGJ, photo]

prove the 80 meter 4-square. (my Bemidji 4-square could have worked better), and phase two 160 meter verticals (one worked great, but a 4-square?).

I spent a year playing with *HFTA* terrain analysis software, planning tower locations, antenna placements and the like. I pored over aerial photographs and maps. Our county's only antenna restriction is that the base of a tower must have 110 percent setback from a property line. The crest of the hill is 100 feet to the north of the house, and the main view from the rooms is to the south — perfect. "My" side of the house gets the antennas, and Vivien's gets the view. The shack (11 × 16) was used as an office and is on the north side of the house, near the front door and at the top of the basement steps — easy access for guest ops and to the towers.

I wanted to rotate the main tower from the ground this time. I used KØXG's rotating base (with prop pitch motor) and four guy rings. The tower base is 120 feet from the shack and is almost 4 feet high, with 160 feet of Rohn 55G above. The guy rings are at 40, 76, 112, and 148 feet. The KØXG boom mounts make "landing" booms to the side of a tower a piece of cake.

Installation: Check!

HFTA had a very sweet spot for the 4 element 40 meter beam between 150 to 155 feet in nearly every direction. It was amazing to see some significant path degradations, even at 160 feet, to many areas. Higher is *not* always better. With a guy ring at 148 feet and easy to stand on, the 40 meter boom bracket was placed at 152 feet — a perfect working height.

Effective: Check!

I acquired a 4 element, 20 to 6 meter SteppIR antenna several years ago and had it on a TIC ring at about 60 feet in Bemidji. That antenna played almost as well as the 5/5 20 meter stack above it! At Dayton one year, I heard a talk, "The Poor Man's Stack," which explained that a 3 or 4 element tribander at about 60 feet was within 1 or 2 dB of stacked monobanders. I can confirm that this is the case. The other nice thing about the SteppIR is that in a couple of seconds, the antenna can be reversed to check long path or even changed to be bi-directional.

Flexibility: Check!

The best bang for the buck is a 2 element beam. Each additional element gives up to 1 dB of additional gain, then rapidly diminishes and physical factors become extreme. Since I had such good luck with the 4 element SteppIR, I decided to put the old one on the multiplier tower and get three new ones for the main tower. These are not huge, and I can handle them myself. True, they are mechanical, and there will be maintenance issues at some point, but even fixed element antennas have maintenance issues. Regardless, on a rotating tower, any antenna can be trammed up and down between guy wires fairly easily, unlike an antenna on a mast above guy wires.

Figure 2 — The big tower has the KØXG rotating base and guy rings. The KØXG boom brackets are used for easy mounting of antennas. The prop pitch rotor is from Curt, K7NV. (LR) Richard, KØXG; Craig, K9CT; Roger, N4RR, and Glenn, WØGJ. [Glenn Johnson, WØGJ, photo]

Maintenance: Check!

Twenty is the toughest band for competition, and stacked antennas for that band would sure be nice. I modeled with *HFTA* for about every conceivable configuration, not just for 20 meters but also from 17 to 10 meters. The heights of 78 feet and 114 feet were wonderful on 20 toward just about everywhere, and 42 feet worked well toward the Caribbean. The other bands fit in nicely, with rare exceptions. The top two positions showed some degradation on 12 and 10, but 42 feet was nice!

I have the Dunestar 800 phase controller that can select any single antenna or any combination of the three antennas. Regardless of the *HFTA* analysis, which works with the average signal paths and angles, the real world, as we know, is very dynamic, and signal paths and incom-

ing signals vary — sometimes quickly. The SteppIRs and the phasing system sure make it fun to play with DX signals. The middle SteppIR is on a TIC ring for independent steering. With my antenna switching setup, I can leave each SteppIR on a single band or combine them.

Run antenna flexibility: Check!

The rotating Rohn 25G tower is 540 feet from the shack, and 600 feet to the rotating bearing at 60 feet. Guy rings are at 30, 60, and 92 feet. An Orion 2800 rotates the 50 foot "mast" above it. At 62 feet is the old 4 element SteppIR. At 96 feet (4 feet above the guy ring) is a 3 element full-size 30 meter OptiBeam monobander. I thought *HFTA* would have optimized this beam higher, but, again, trusting the software, 95 feet was about optimum for all directions.

At 112 feet is a 40 meter rotating dipole for multipliers — maybe a 2 element 40 meter some day. At 60 feet is an inverted V for 60 meters.

Multiplier beam and 30 meter beam: Check!

The 80 meter 4-square center is about 600 feet away from the shack, about 1100 feet east of the multiplier tower. Insulated bases are about a foot above the concrete pads. Each tower is 60 feet of Rohn 25G, with a "stinger" for tuning at the top. Each vertical has two gull-wing elevated radials. The SWR is less than 2:1 across the entire 80 meter band. The phasing system is the new Array Solution 80 meter 4-square controller. I also have a 75 meter dipole suspended from the 112 foot guy ring on the big tower. It is cut for 3.850 MHz but also has an interesting dip at exactly 3.520 MHz. Go figure.

Flexible on 80 meters: Check!

As many of you know, I like 160. In Bemidji, I had a single, full-size elevated radial 160 meter vertical. I placed first place world four consecutive years in the QRP category of the ARRL 160 Meter Contest and have several other QRP plaques from other 160 events. For another 3 dB, I used the rest of my supply of Rohn 25G to put up two full-size 160 meter verticals with insulated bases at 25 feet for elevated radials. The total height for each is 154 feet. They are in a pasture southeast of the house, 850 feet from the shack, and can be seen from the house living area. I think it is a most beautiful view, but Mama isn't too happy. But hey, beauty, is in the eye of the beholder. She is getting used to it now, and she sees through and beyond them, but I still can't.

I use the Array Solutions phasing control, and with the verticals spaced 0.5 λ apart using 0.375 λ (electrical) feed lines, I can beam 75°, 255°, end-fire (east-west) or broadside (north-south). There are two to four S units difference between end-fire and broadside.

We got the last of the towers up as the snow was falling in December 2012. The phased 160 meter verticals were the only antennas operational last winter. I finished the phasing and coax only hours before the ARRL 160 Meter Contest. I did have the rotating 25G up at that time, and had a 160 meter inverted V at the 115 foot level. I did A/B testing between the two, and even though the inverted V was a killer, it was nothing compared to the verticals.

160 meter "beam:" Check!

It is one thing to have a single "low" tower and one radio. As one gets more radios and antennas, there is a logarithmic curve in the complexity. All guys are Phillystran. There is no steel. I borrowed a trencher for

Figure 3 — The shack — perfect for SO2R and M2 operation. Either radio can grab any antenna instantly. A microHAM MK2R+ makes SO2R operation easy. I use DXBase for general logging and N1MM Logger for contesting. [Glenn Johnson, WØGJ, photo]

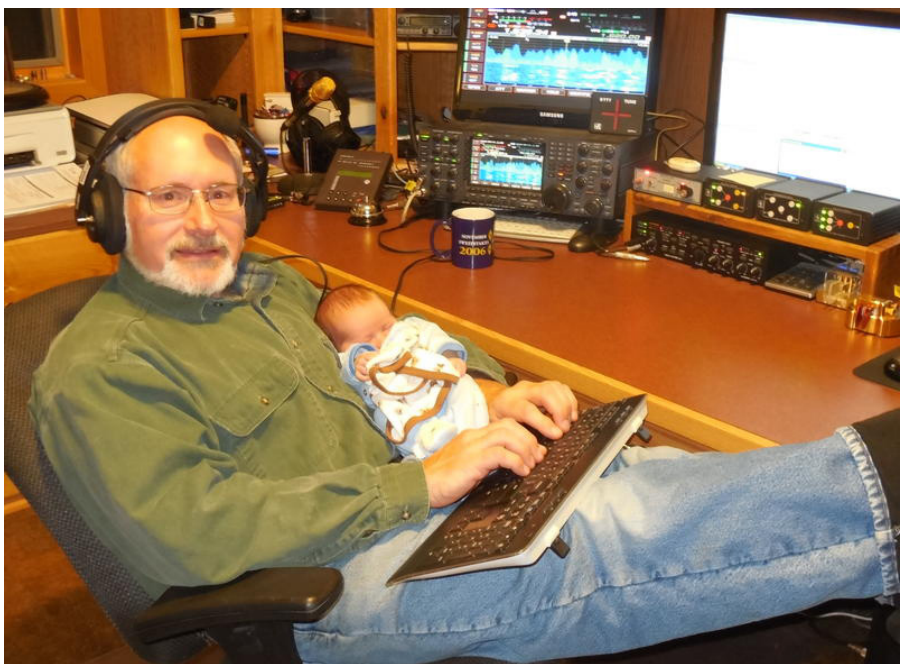

Figure 4 — Contesting at 5 days old! No better way to learn the code. I don't think I quite qualify for a multiop entry in the ARRL 160 Meter Contest this year, but maybe next year when grandson Lincoln knows the code. [Glenn Johnson, WØGJ, photo]

my Bobcat and have more than 2000 feet of trenching. Everything is buried, including control lines. I've used more than 3000 feet of 7/8 inch CATV hard line. Yes, it is 75 Ω. Some runs need 75:50 Ω baluns at one end or maybe both. Others I've tuned/trimmed for a match. I bought the hard line surplus for the same price as one would pay for good RG-213. My loss on 160 is 0.3 dB for an 850 foot run.

I came into possession of some surplus LDF7, tons of LDF6, and some LDF5 Heliax. I use LDF6 and 7 for the 40 meter beam, and the calculated loss is something like 0.09 dB. LDF6 is one long run for the 80 meter 4-square. For the two rotating towers, I have buried spare runs of hard line and control cables. The only coax in use is for jumpers from hard line to lightning protection or rotation loops.

All buried feed line is hard line, and all feed line up the towers is hard line. The SteppIRs all have the remote driver/lightning protection boards and use CAT5e cable runs instead of control wire. I have I.C.E. and Polyphaser coax and control line lightning protection at each end of every feed line and control line run. Every antenna feed line comes into the shack to an A/B switch. I've used dozens of Cinch-Jones plugs on all control lines for modularity and troubleshooting. I have a standard wiring color scheme. In the trench between the main tower and house are ground rods every 10 feet. Many more are around the house and service entrance box. An electrician helped me redo the wiring/grounding of the house. There is a 120 V ac outlet at the base of the two rotating towers and at the phasing boxes of the 160 and 80 meter arrays. All towers and the house have common grounding. I've used nearly four dozen rods in grounding the towers and the house.

Redundancy: Check!

In the shack, I have a large operating desk with plenty of elbow room and plenty of room for two operating positions. There are two rigs — an Icom IC-7800 and an Icom IC-7600 — almost ergonomically identical. Each rig has an ACOM 2000A amplifier. I have the DX Solutions Smart Antenna Switches (SAS-6) for each radio. These are controlled by the radio, and each radio automatically picks from an A/B switch the desired antenna. There is an automatic default for each band that can be overridden at the push of a button. These also choose the proper band-pass filter (Dunestar 600s). A microHAM MK2K+ is used for SO2R. *Flexibility: Check!*

I officially completed this project one year and one week after we started taking down things in Bemidji. I've spent hundreds of hours planning, and it seems like even more on the tower and in the trenches (literally). I've checked and double checked each connector and connection at every step of construction and assembly. Everything is labeled and organized. I've kept an engineering notebook of everything I did, with descriptions and dates. I've been extremely pleased with the effectiveness of everything. I've added a lot of new band countries, especially with that killer 30 meter beam. It still catches my breath to watch that big tower rotate with all of those antennas on it.

Finished: Check!
Satisfied: Check!

Acknowlegements

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Now, I *am* looking forward to retirement in a couple of years, to enjoy the bottom of the current sunspot cycle. I'm ready. I'm especially looking forward to this upcoming contest/DX season. What a *long* year it has been — 53 weeks, to be exact.

More details and more pictures are posted on QRZ.com

+3 dB: Check!
Divorce: No check!

A version of this article originally appeared in the Twin City DX Association newsletter The Gray Line Report *and is used here with permission.*