Klaus Spies WB9YBM
815 Woodland Heights Blvd.
Streamwood IL 60107

Make Your Own VHF DX!

Need a neat club activity?

It's one thing to wait for band openings to happen — and on VHF, they can be a long time in coming — but it's quite another to create your own. Why wait for an opening to happen?

The Weathersfield Radio club participated in several band openings of both kinds, but the most fun happened when we created our own. Here are a few of the options we explored.

The first DX we got involved with on a proactive basis was aeronautical portable operation (no, not "mobile," since we did not use mobile radios operating from on-board power with an antenna mounted to the vehicle, but "portable," as in a hand-held transceiver with an independent power supply and its own antenna). With Rolf N9BRL volunteering his piloting skills and Cessna, I took both a two-meter and a 220 MHz HT up to about 3,500 feet. With just one watt and a rubber duck antenna, contacts were made into Chicago and northwest Indiana on simplex, while flying over the south central portion of Wisconsin.

Propagation and signal strengths were similar to what is experienced in base-to-land-mobile operation, but with a lot less power and antenna at one end. To confirm the propagation characteristics we noticed, we have since worked other aeronautical stations since then, with similar results — another station coincidentally also flying a Cessna from Chicago to south central Wisconsin; a ham who was a passenger on a commercial jetliner at 5,000 feet landing in Kentucky (he had a window seat facing Chicago, and came in full-scale); and the business jet that was owned by Amateur Electronic Supply in Milwaukee, Wisconsin.

In comparing two-meter to 220 MHz operation, Ken N9HXD and I noticed a very similar range between the two bands, with Ken quantifying it at about

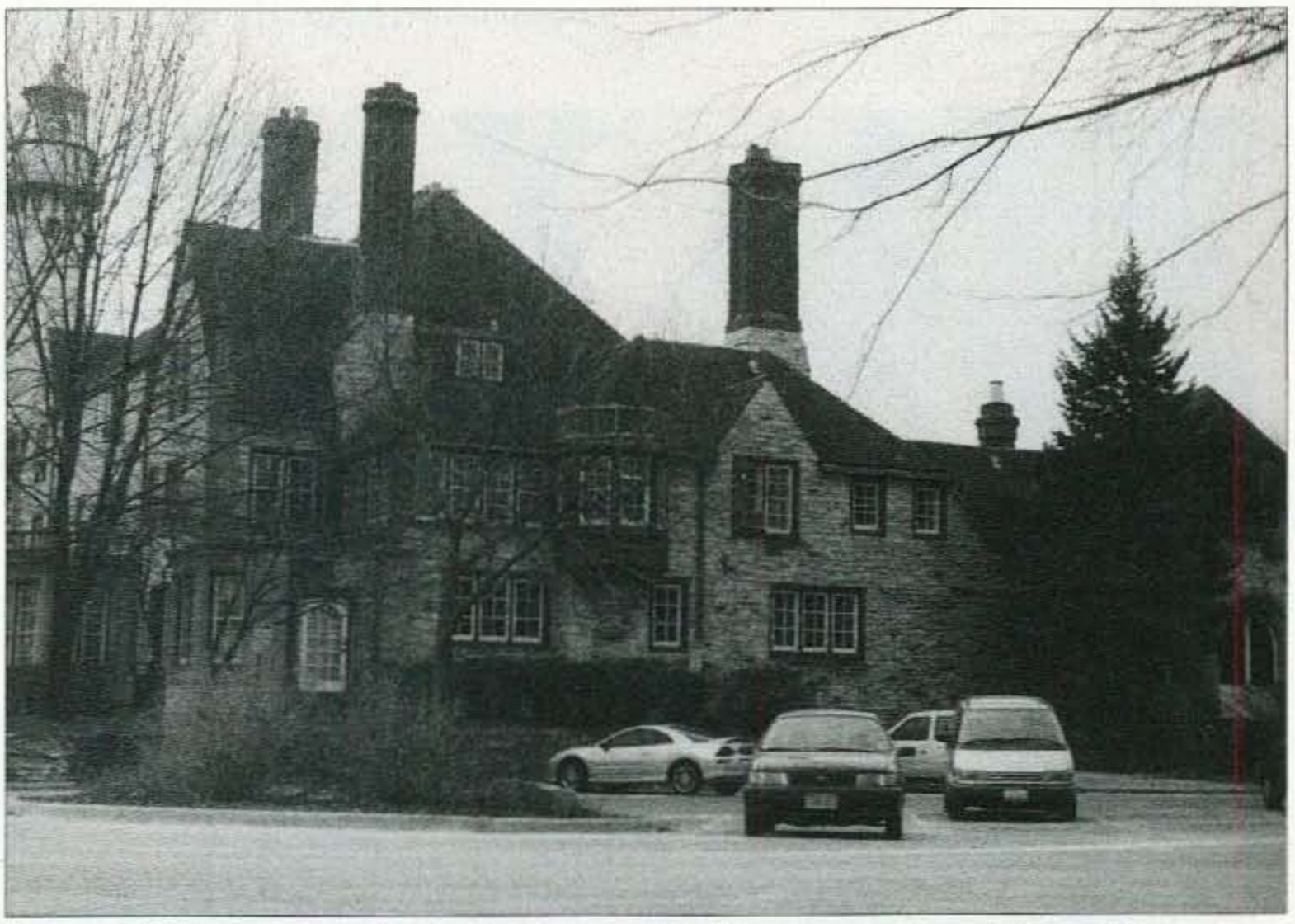

Photo A. *Lighthouse parking lot in Evanston IL. The elevation here is 15 to 20 feet above Lake Michigan. The building used to be the residence of the light keeper and family but is now a gallery for an art museum. Lighthouse can be seen at extreme left.*

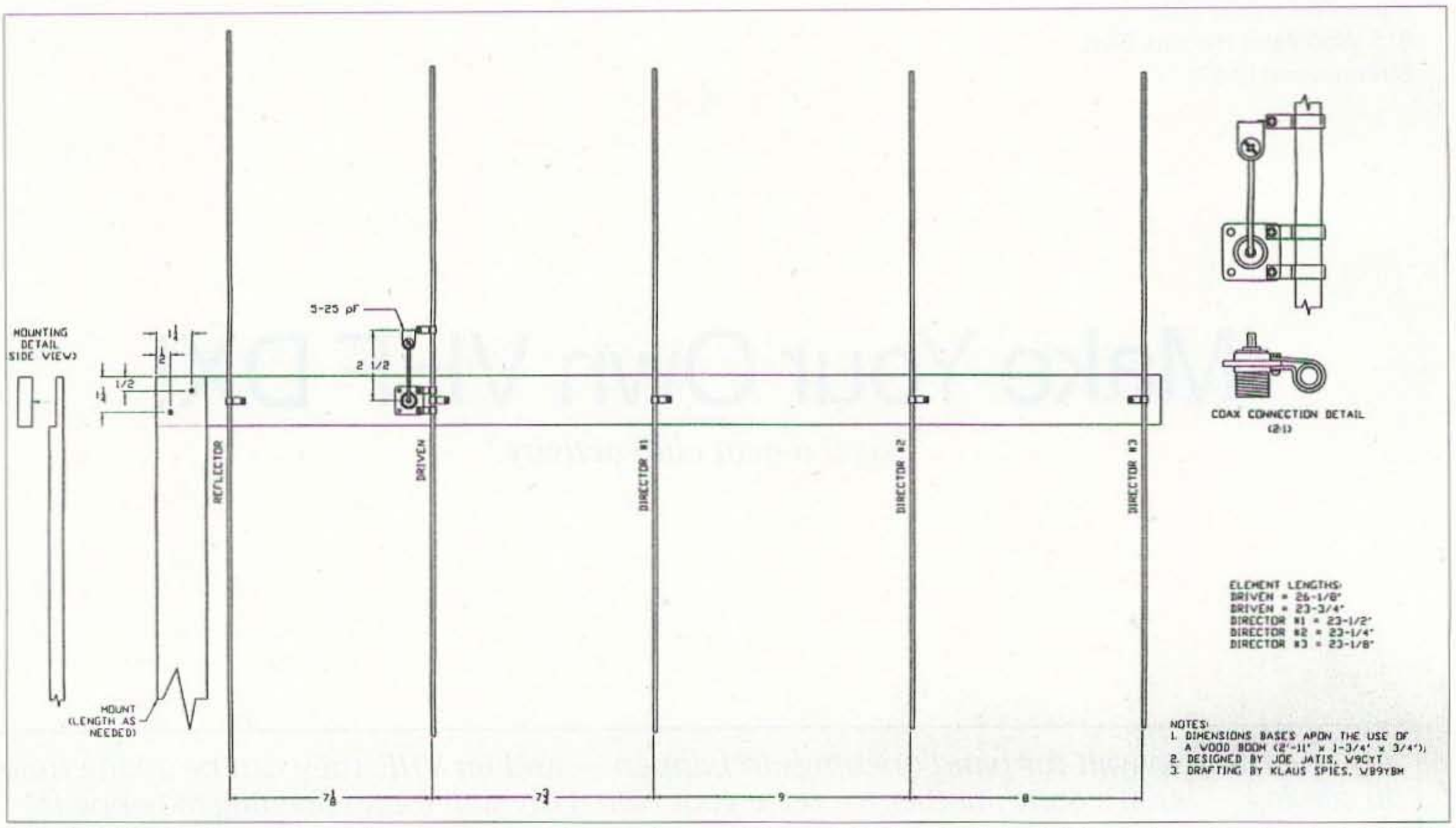

Fig. 1. *220 MHz beam. Dimensions based upon the use of a wood boom (2'11" x 1-3/4" x 3/4"). Designed by Joe Jatis W9CYT (drafting by author).*

a ten percent shorter range on 220 MHz. Since the repeater density on two meters is such that it does not take much of an increase in range to access multiple repeaters — even minor openings have been known to cause problems in areas like Chicago — it was decided to concentrate our tests on 220 MHz.

One final test involving two meters involved an attempt at DXing from the observation deck of the Sears Tower, in Chicago. With Ken running a 220 MHz HT with a rubber duck and low power, he was able to access repeaters in Michigan, Indiana, and Chicago. Klaus was running the same type of equipment (Icom HT with a rubber duck antenna) on two meters, and found the only accessible repeater was in a northwest suburb of Chicago — it was hard to get repeaters even in downtown Chicago. After a brief discussion, it was realized that the glass used in the observation deck was most likely the culprit: To attenuate the bright glare of sunlight on a clear day, a slight tint had been added to the glass. This tint, we assumed, was probably in the form of some type of metal halide crystals embedded in the glass, similar to the metal halide material

Photo B. *Test vehicle on station.*

223 MHz, 5 elements, 0.125 inches	
at 0.000	13.16 in.
at 7.125	12.375 in.
at 15.0	11.66 in.
at 24.0	11.625 in.
at 31.825	11.56 in.
Gain = 7.47 dB	
Front-to-back = 12.25 dB	
z = 41 ohms	
swr = 1.0	
Gamma match = 2 inches 0.125 in. tube + 17 pF cap	

Table 1. *Long-boom 5-el specs.*

used in black and white film, and this was shielding incoming and outgoing RF.

One debate that's taken place in the club has been: Which helps range on VHF the most, antenna height, or simply getting the antenna height above the majority of the "ground clutter"? It seems that for every two people who are asked that question, there are twice as many answers — or opinions. We've managed to get a bit of proof for both. The proof of the second took the form of a mini-van, with a magnetic base and rubber duck antenna on the roof. The HT was driving a 15-watt amplifier. With this arrangement, it was possible to get from the Loop in Chicago into a northwest suburban repeater full quieting. Other tests seemed to confirm that this antenna did as well as a 5/8-wave antenna mounted at half that height (on the trunk of a car).

Proof that it's height and not just clearing ground clutter that helps range came in the form of a field test done in the parking lot of the lighthouse in Evanston, Illinois. The parking lot is a good fifteen to twenty feet above Lake Michigan, and we went yet another ten feet above that to clear ground clutter (pedestrians, vehicles, etc.). For added advantage, we used a home-brewed five element 220 MHz beam made by Joe W9CYT/SK. Dave N9ZAZ ran the numbers through a computer program and calculated that the antenna had just slightly over 7 dB forward gain, with about 12 dB front-to-back ratio. With an Icom IC-38A running at maximum (although rated at 25 watt output, it was measured at 30), there was about 120 watts coming out of the front of the antenna.

In spite of all of these advantages, we were unable to get into our favorite repeaters in Michigan. On the plus side, though, we took advantage of the clear shot across the lake by shooting a signal down the coast southward into Indiana, and worked Bud N9WXY through KB9KRI/R on 224.12 MHz. We were not quite as successful toward the north into Wisconsin. Pointing the beam inland, we were able to access the Crystal Lake, Illinois, repeater on 224.70 MHz with the radio in the 5 watt position, which we calculated as 40 to 50 miles (in this case, I wonder if a lack of ground clutter killed our signal across the lake, because it certainly helped while we were pointing the antenna inland!).

Conclusion

While we may not have been able to find out what the exact methodology is for DX — a combination of the two mentioned? — the answers to our questions certainly seem to take second place to the fun of expeditions — all while proving that we don't need to haul a truck load of gear with us to do it.

Final notes

Thanks to Christel Spies (as yet unlicensed) for help in the lighthouse expedition. Also, to Joe W9CYT, who passed away before he could take part in a 220 MHz expedition — although I'd like to think Joe joined us in spirit. I hope we did okay by you, my friend. 73