

Contesting with a Pea-Shooter Station

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Contesters and DXers are usually said to operate from one of two classes of station: Big guns (we all know who *they* are), or little pistols (think tri-bander and wires). Well, I'm here to represent a third category, the *pea-shooters*, and tell you how to make the most of a very limited station.

Pea-shooters are usually situated in CC&R communities (like me), apartments, rented rooms, trailer parks, on impossibly small lots with no trees, or they may simply have financial limitations or other reasons that prohibit large antennas and elaborate station installations. And yet we have a desire—sometimes a really serious desire—to work difficult DX and join in radiosport activities. Let's see how to make that a positive experience.

Operating Practices

Your operating practices are extremely important. Don't bring a knife to a gunfight and expect an easy win. Instead, you must learn to be patient, smart, and carefully choose your modes and times of operation to take best advantage of your limited station resources. I'm covering this subject first because it's universal to all contesters, and even with a limited station, a better operator may prevail.

Don't let frustration and envy rule your operating sessions. I know the feeling, listening to the big gun a few miles away, running DX stations when I barely hear a whisper. If you're just starting out, be a happy *casual contester* while you learn your station's true capabilities. Try as many contests as you can to obtain experience in how the contests and your station actually work. Discover your weaknesses and come up with strategies to address those, or avoid your optimally-bad situations in real contesting. In the meantime, you can score new DXCCs, band fills, states, or whatever awards you may be chasing. Have fun while learning. It took me a good two years to really figure things out and even with the same station, I'm now much, much better at scoring points.

Set reasonable goals. Obviously we're not going to win a major competed category, but some contests have so many micro-categories that an actual award is absolutely within reach. For instance, four years in a row I "won" the ARRL DX CW contest by entering as single operator, low power, unlimited, for the East Bay section. With only a few competitors, I got some wallpaper, and by golly that feels good! Bob, KO6LU, running just a vertical, has wins in RTTY Roundup, ARRL DX, and ARRL 10m. So we *can* be winners.

Plan ahead. Before a contest, study previous year's results, see who did what, then figure out where you might be able to compete. Choose contests where you may be more competitive, or simply have more fun: QSO parties and CQ-WPX treat us well (especially if we have an odd prefix). Another goal I enjoy is trying to score at least 10% of the points achieved by the top California single-op.

Also remember that we all contribute to the NCCC bottom line in each major contest, no matter what our scores may be. Important: When you turn in your Cabrillo log, be sure it says “CLUB: Northern California Contest Club”.

Make a list of preferred antennas for transmit and receive on a per-band basis. See if one consistently outperforms on DX or short-haul contacts. Choose the best time of day—RFI-driven as well as band conditions—that favor your station. For instance, I know my neighbor’s plasma TV will be obliterating 80 m in the evening, so instead I prefer to visit that band in the wee hours of the morning. The high bands (sunspots permitting) are generally friendly to those of us with minimal antennas, so get up there on 10 and 15 as much as possible during the day.

CW and RTTY will generally work better for us than SSB. The extra bandwidth and lower average power of SSB amounts to upwards of a 10 dB penalty compared to CW. I find it extremely difficult to be competitive on SSB. In fact, just reaching DXCC is turning out to be a serious challenge... But RTTY is quite rewarding, and works at least as well as CW here. If your CW skills are not up to snuff or non-existent, check out CWops.org where we offer training and practice at all skill levels. Outside of contesting, the weak-signal digital modes like JT65 truly save the day for the pea-shooter station.

Search and pounce remains the favorite of most pea-shooter operators. It’s always my best bet when conditions are poor: Nobody calls me when I try to run. S&P is also preferred in the first half of a 48-hour contest when things are manic because finding and especially holding a run frequency is usually impossible. Being a *Sunday driver* can be most rewarding for the pea-shooter because the big boys will be running out of stations, and you don’t have to compete so often in shoot-outs (mini pile-ups), which I can attest that we almost always lose. When I have limited time to operate in such a contest, I choose the later part. You may also be able to have some good runs at that time.

Try running, if you can find a spot. I usually move up the band where the slowskis are. Then I listen for a good long time because more than likely there is someone already running there that I simply can’t hear. When the coast is clear, call CQ and see how it goes. In a DX contest, I’m absolutely thrilled to get a call every minute. In a QSO party, it’s often better than that since the short-haul signal for a pea-shooter is at least marginally competitive. My cutoff time is typically 5-10 minutes without an answer before I go back to search and pounce. Don’t be surprised if someone stomps on you and tries to take your run frequency. Happens all the time. Call CQ a bunch of times and see if he hears you and goes away. Or slide over a bit, to where you can hear callers. Or go somewhere else and start again. Sometimes it’s just hopeless. Back to search and pounce.

When you start running on CW or RTTY, fire up the Reverse Beacon Network[1], and have it search for your call. Then you can see your measured signal strength all over the world. If only a few skimmers spot you, don’t expect much action (Fig. 1).

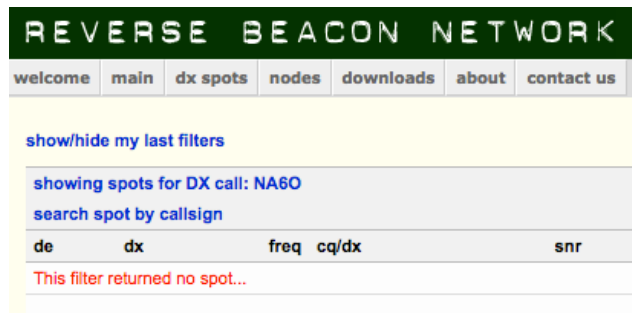


Figure 1. This is what I sometimes see from the Reverse Beacon Network: Nothing. Definitely time to change bands, or search and pounce.

Speaking of shoot-outs, always watch your score in your logging program and determine whether it's worth calling a new multiplier station for a very long time. (But if it's a New One, heck yeah, I'm going to burn on that frequency!).

I do use spotting whenever it's permitted since I'm in search and pounce mode so much. It really cuts down on the search time when I first switch to a new band and helps me find multipliers and New Ones. Also it gives you an idea of relative activity level, helping to decide when to switch bands.

If you have the space, money, and desire, there is nothing to stop you from trying advanced operating techniques like single-operator, two radios (SO2R), or using two VFOs (SO2V) and other methods that tend to generate higher scores.

Above all, become a better listener. I am thrilled when my S meter moves at all, so my weak-signal copying skills are now top-notch. DXing is great practice for contesting, with all the variations in propagation and signal distortions and of course the weakest of signals.

Antennas

Limited antennas are the very definition of the pea-shooter station. Sorry, *no* towers, and even a push-up mast or roof tripod is out of the question to support even the smallest Yagi. That leaves us with wires, verticals, and loops. Your main objectives are to cover as many bands as possible (often with an antenna tuner) so as to obtain maximum multipliers, access low radiation angles for DX, achieve good efficiency, and minimize RFI pickup. Doing all of these things in our limited spaces, often with low-observability, is a real challenge.

There are countless designs to consider. Check the various ARRL publications, and also our own K9YC's presentation on limited-space antennas[2]. Here are a few popular solutions that I have experience with.

1. A fan dipole with a K9YC-approved common-mode choke (a.k.a. balun). Efficient, resonant, and lowish noise in urban environments. Hang it as high as you can, even if it's bent, or with some loading. Mine works well enough at only 15 feet elevation and made of 20-gauge wire. Small wire and clear plastic insulators reduce observability. At such a

low altitude, it is nearly omnidirectional on 80 through 15 m with most of the energy radiated straight up.

I ran HFTA, looking toward Europe, and compared this dipole on 20 m against a 3-element Yagi at 50 feet. The difference was typically greater than 10 dB at the lower takeoff angles. So yes, I have tower envy, in a big way.

2. Verticals, of the off-center fed dipole variety that do not require radials. Examples: Cushcraft R8, R6000; Hy-Gain AV-640; N6BT Bravo series, etc. Very handy when you have no space for radials. Go for models with fewer traps, which equals better efficiency. Mount it as high as you can. They are all fairly light and easy to handle but some taller models need guy ropes. Paint it NATO non-spectral gray, otherwise known as gray automotive primer, for lowest observability. (If it works for military fighters, it works for me!) I can pretty well guarantee that the noise level will be higher than that of any dipole you may erect, but you have at least a chance of producing some low-angle radiation depending upon your local soil properties.



Figure 2. My primary antennas, a vertical and fan dipole. This is a flagrant violation of my CC&Rs, but I have yet to get caught.

3. A low-noise magnetic receiving loop (Fig. 3). These are effective against very close-range RFI sources, which can be dramatically nulled by rotating the loop. They are basically omnidirectional for skywave communications except on 80 and 160 m. I use a Wellbrook ALA1530 to good effect all the way up to 15 m. Pixel Technologies is another maker.



Figure 3. A magnetic loop antenna for receiving, oriented to null out the evil plasma TV next door. Note the sophisticated rotation mount and support structure.

4. Conventional verticals, end-fed wires, and inverted-L designs. If you have space for radials, or use some kind of a counterpoise resonating trick, many of these unbalanced antennas will work. Again, altitude is your friend. Put that vertical on your roof, and pave it with radials resonant on each band. Tie the end of the wire to the highest available object.

5. Get creative. Mangle that dipole by running it under the eaves, around the corners, over the bushes, and along the fence. Use a mobile antenna on the bumper of your car. Build a trailer with a crank-up tower or mast, and park that on your property during contest weekends. It's great for Field Day, too. Try a transmitting magnetic loop. Get a Buddipole and it's mast kit for temporary use (another ham in my tract sets his up on the front lawn. Take that, Neighborhood Nazis.)

You can never have too many antennas. Whatever you may have, make your arrangement switchable in a convenient manner so that you may use the one with the best signal-to-noise ratio for receiving, while using the one with the best absolute signal strength for transmitting. That may or may not be the same antenna. For instance, my verticals are often the best radiators, while my low-noise receiving loop or the low dipole are almost always the best receiving antennas.

I suppose the one advantage to all of these antennas is that being omnidirectional, I never have to worry where to point them to maximize my rate!

Radios, etc.

A top-notch radio can help overcome *some* antenna limitations. DSP noise reduction is a godsend to the pea-shooter operator. I'm sure that a quarter my QSOs would not be possible without the noise reduction and noise blanking available on my TS-590s; it's a miracle. Better filters and the high dynamic range of the best receivers are crucial to the contester, probably more so for us little guys. Obviously, a modern rig with a CAT interface is also mandatory for automatic logging and other automation conveniences.

You definitely should use one of the top contest logging programs such as N1MM or WriteLog to maximize your efficiency; this will also come in handy if you operate another contesters' station. Make sure you have a reliable computer, too.

Running higher power certainly helps to overcome limited antennas. It's bad enough that I can't hear very well, but even worse when I *can* hear the other guy and not make the QSO. Adding a KPA500, which I call my \$2000 S-unit, has been valuable when the going gets tough. It definitely removes a degree of frustration as well, and a happy operator is a productive contesters. Use caution though: If, like me, you or your neighbors are sitting close to your antennas, an RF exposure estimate is mandatory. Running full legal limit would not be advisable at my station. Also, my invisible-wire antennas may well vaporize!

One more thing about high power: Don't be an alligator (all mouth and no ears). If I know that I'm not hearing well, running can go really badly with high power. I either turn off the amp, or switch to S&P.



Figure 4. Compact and simple stations, yet capable of contesting. Bob, KO6LU (L), and Gary, NA6O (R).

Dealing with RF Interference

Being in close proximity to modern electronic devices is the bane of the ham's existence when it comes to RFI. We are inundated with ghastly switching power supplies, non-compliant LED lamps, poorly-shielded computer stuff, pot farmers with evil grow bulbs, plasma TVs, and so forth. We are also likely to interfere with neighbors' and our own home entertainment equipment, internet, and other things. Our radio gear may be located way too close to our antennas, resulting in RF in the shack and all kinds of equipment problems.

All of these issues are magnified by the pea-shooter's close quarters and fundamental limits on physical positioning of antennas and equipment (Fig. 5). For instance, two my primary antennas are 15 and 20 feet from my neighbor's den. *That* is a major problem, in both directions. And my rig is right under my vertical and my dipole is 10 feet over my head. If I had any hair, it would probably stand up when I transmit. There is nothing I can do to change this geometric situation, but clearly it would be of great benefit if I had more flexible space.

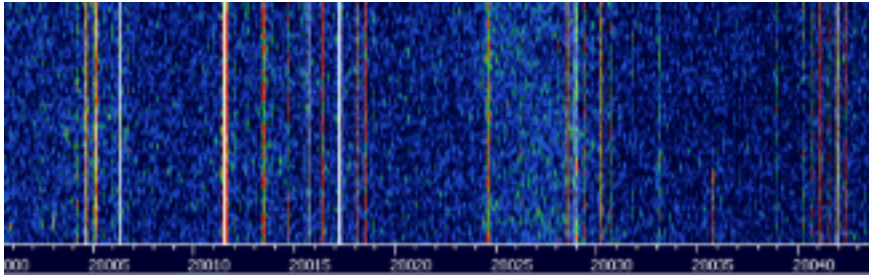


Figure 5. A typical moment of RFI on 10 m at NA60. Computers and peripherals, networking equipment, switching power supplies... The list goes on and on.

RFI management is a complex subject and I must recommend you start by reading some key references[3] [4]. Get advice from your fellow NCCC members, many of whom are well-versed in this. Contesting.com has an RFI email list where many experts hang out and are happy to help[5]. The following measures are generally advisable, within of course the limits of your particular situations.

Try to locate antennas farther from all houses, as well as your rig. Install common-mode chokes on all coaxial lines and control wires that exit your shack. Bond *all* of your equipment together, and bond that to your home's grounding system (this is super important if you live in an area where lightning is likely). Run high power (>100 W) only when necessary. Be friendly with your neighbors and volunteer to help eliminate interference both to and from their equipment, typically by installing chokes. Clean up your own home first: Turn of circuit breakers while checking all bands and see if you can find unexpected RFI emitters. Use a portable AM/FM/SW radio as a sniffer. Replace crappy wall warts with linear power supplies, or known-clean switchers. Use high-quality shielded cables for station interconnects. Add common-mode chokes on cables that seem to be problematic, for instance serial or USB devices that misbehave or crash your computer.

Conclusion

You, too, can be a contester with just a pea-shooter station. The operating experience you gain will be valuable no matter where you operate. Hone your skills, keep trying different antennas, and fight the RFI battle. Most of all, make contesting fun.



Acknowledgements

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References

1. Reverse Beacon Network: <http://www.reversebeacon.net/main.php>
2. Limited-space antennas by K9YC:
<http://audiosystemsgroup.com/LimitedSpaceAntennasPPT.pdf>
3. K9YC has several important RFI-related resources that every ham needs to read, located at: <http://audiosystemsgroup.com/publish.htm>
4. ARRL RFI Book
5. RFI list at Contesting.com: <http://lists.contesting.com/mailman/listinfo/RFI>