

Banner: Contest Results, Roving, Mentoring, and More!

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Top Photo: Jim Wilson, K5ND, a serious VHF contester and roving enthusiast. [Courtesy of Jim Wilson, K5ND]

Bottom Photo: Gary Sutcliffe, W9XT, a veteran contester, NCJ columnist, and engineer in his shack. [Gary Sutcliffe, W9XT, photo]

An In-Depth Look at the K5ND VHF Rover Setup — Part 2

NCJ has run some great articles recently on the subject of VHF Contesting. My own contributions have been, “K5ND’s VHF Limited Rover Experience,” in the January/February 2020 issue followed by “Magic Band, Magic Contesting” in the May/June 2020 issue. If you’ve followed the story so far, you’ll already know the major tenets for VHF roving. The key principle, articulated by Greg Jurrens, K5GJ, in his 2019 NCJ series of rover articles is:

The fine art of stuffing every piece of VHF and microwave gear you own into and onto your vehicle, and then driving hundreds or thousands of miles, all the while contacting the same people over and over again.

On top of that is the basic tenet of VHF Contesting by Joel Harrison, W5ZN:

Magic Bands with Super Results from Average Stations.

Then there’s my own contesting corollary:

There’s always something to improve in every aspect of your contesting efforts.

That’s why we contest. A score from one contest to another helps set and hopefully beat personal benchmarks. Plus, you also have your fellow competitors setting a high bar. Their results become particularly helpful when in the same category and territory.

My own guiding principle, frequently disregarded, is to keep things simple. I also realize that this is a hobby, not a profession, and as such I get to choose how I enjoy that hobby. For me that is solo roving. Plus, I’m not keen on distracted driving, as I have enough trouble driving without distractions. So I make contacts only when I’m stopped.

With that background, let me show



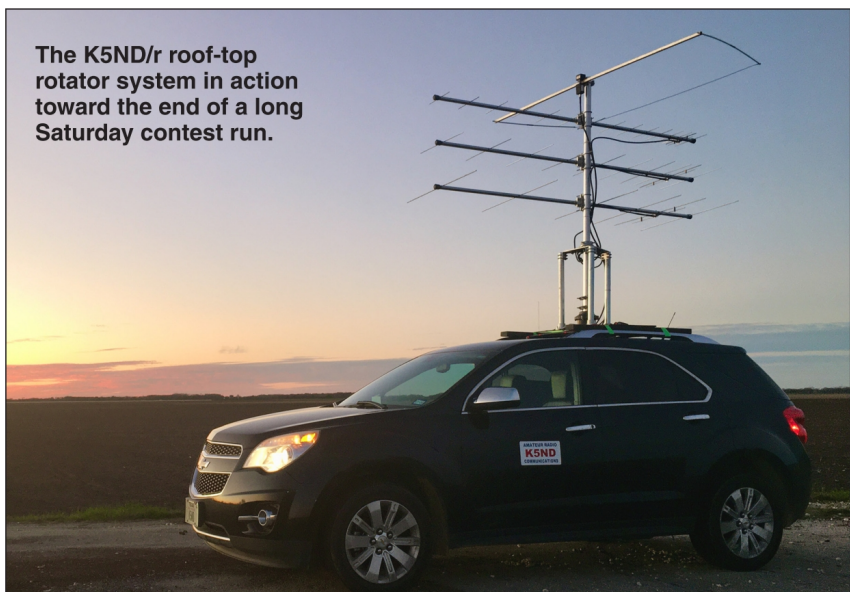
The K5ND/r push-up mast in the rain during the ARRL 2018 September VHF Contest. Note the stand-up position in the back along with the tarp to provide some protection from the rain.

you my ride — everything stuffed into and onto my car, average equipment with reasonable results — along with the improvements I’ve discovered along my contesting journey. The last is a metaphor that perfectly fits a VHF rover.

Antennas and Pointing Them

This is where I’ve spent a lot of time examining and implementing various options. I started out with a painter pole and then a fiberglass pushup mast, setting up in each grid. Two things motivated me to the next phase: 1. the extensive time and muscle required to set up in each grid, and 2. the weather challenges when standing out in the rain or the heat.

A number of rovers use a roof-top PVC framework to hold their antennas. With this method, they use the vehicle as the rotator, pointing the car/antennas toward the station on the other end. They also usually have some omnidirectional antennas for use while in motion, plus they often have a second operator running



The K5ND/r roof-top rotator system in action toward the end of a long Saturday contest run.

things while in motion. Tracking the contest results from these stations shows that it's a winning approach.

None of that for me! First, as noted above, by personal preference I'm not operating while in motion. So the omnis aren't needed. Second, in the little side alleys and roadside stops that I find, it's pretty difficult to move the car to point in the desired direction, hence the roof-top rotator assembly.

Roof-Top Rotator Assembly

I already had a Yaesu G-450 rotator that I was using on a home-based pushup mast. I also like the Directive Systems rover Yagis, all with eight-foot booms, as well as a Par Electronics 6-meter Moxon. My next step was to determine how to mount all that on the roof.

I've seen some excellent models using metal frames and attachments to the rooftop. There are also tripod or even tower systems in truck beds as well as masts that mount on trailer hitches. No truck bed or trailer hitch here, and no particular skills or tools for metalworking. So I opted for my go-to assembly methodology — 2 x 4s and plywood.

The concept was to build a frame that could easily be strapped to the

roof rack, one that is lightweight but also able to withstand 80-to-100 MPH winds. It needed to be lightweight not only for car roof support capabilities (Chevy says 220 lbs for the Equinox) but also for lifting it into place before each contest. Then it needs to hold me standing on it when I mount the antennas and for the occasional fix for a snagged antenna during the contest.

I use the side rails for mounting to the roof rack with heavy-duty tie-down straps. Ratchet tie down straps rated at 500 lbs or higher work very well. Make sure the ratchets and/or the end connectors fit through the roof rack. I use a couple wraps around the rack and each of the four legs of my antenna mount.

For my wooden platform, I use two 2 x 4s laid flat to line up with the roof rack side rails. There are also two 2 x 4 cross members secured with lag screws and glue along with a 1/2-inch plywood section laid on top of that and secured with screws and glue.

For the antenna system, I chose a heavy-duty thrust-bearing DX

Engineering DXE-TB-300 as the core of my mounting system. It can hold a 2-inch, 6-foot aluminum mast from the rotator. The three-leg frame was topped off by a DX Engineering Tower Accessory Shelf, DXE-AS455G. The three legs of the frame are 1.75-inch Steel-Tek pipes and flanges that I picked up at Lowes. The flanges mount to the plywood and 2 x 4 platform where the rotator is also mounted. All this taken together makes reasonably sure the mast doesn't move or fly off as I motor down the highway.

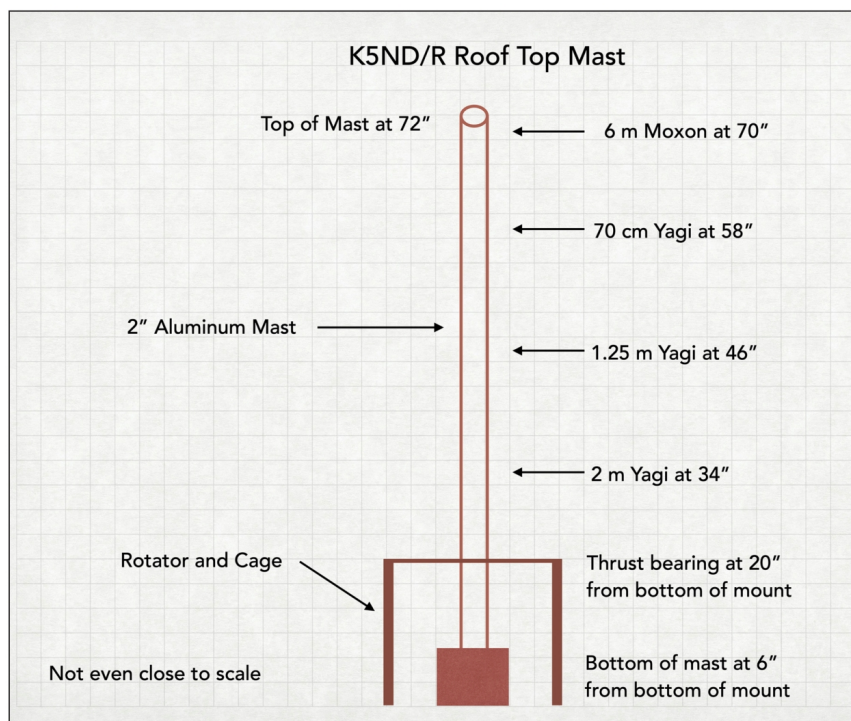
That doesn't account for low-hanging branches. The overall height is 12 feet, which works for most bridges and many, but not all, trees. Of course, I'd like it to be higher when I'm stopped and working stations. But for the flatlands of north Texas and southern Oklahoma where I'm operating, it works just fine.

Operating Position

Since I'm not operating while in motion, I elected to set up my operating location in the back seat.



The K5ND/r roof-top rotator mounting system ready for the road.



The K5ND/r roof-top mast setup.

Dropping one side of the back seat for ready cable access to the back of the SUV also allowed me to build a wraparound operating table.

Remarkably, I managed to build that table from chunks of 3/4-inch plywood left over from previous projects. Everything fit together perfectly and, in that way, even presented the best layout. I used bolts and wingnuts to hold everything together. I further used some yoga mats on the tabletops to help prevent the equipment from sliding around while driving. Ideally, equipment would be strapped down as well.

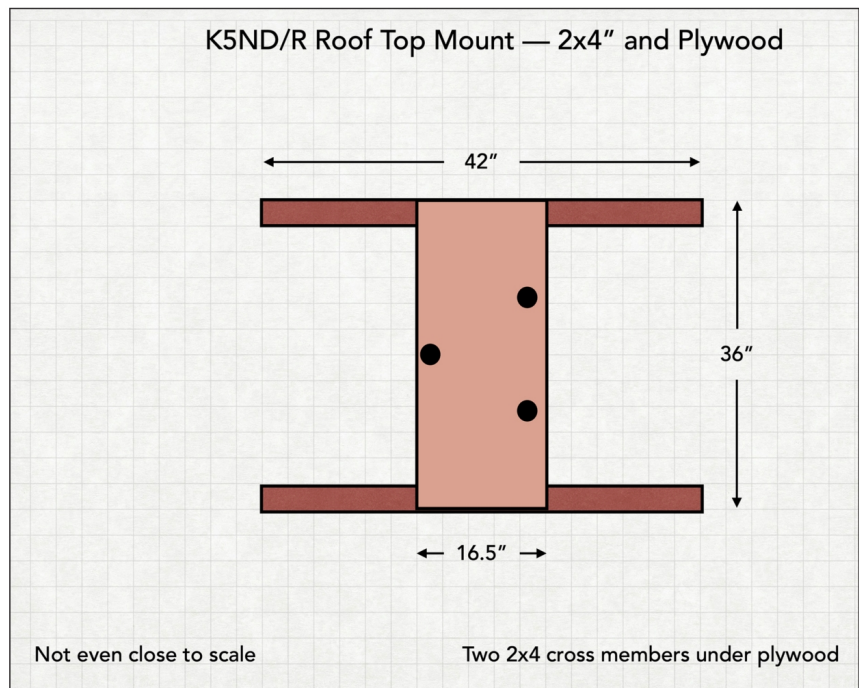
I also use the window on that side of the car to route the coax and rotator cable to the rooftop. A piece of pipe insulation seals the window and allows the cables through. I have not suffered with much, if any, wind noise, and I have no experience with heavy rain yet. This setup could probably be pretty good for two operators, with one operating while the other was driving. Don't rotate the antennas into the oncoming traffic though.

For the January 2020 VHF Contest I used two rigs, an Icom IC-9700 and an Icom IC-7300, along with a laptop and large monitor. The monitor is secured in place with a bungee cord connected to the front passenger seat. All that worked pretty well, particularly since most QSOs were using *WSJT-X* modes, instead of just picking up the mic for SSB contacts.

Rigs, Transverters, Amps, Preamps

For the January contest I used an IC-7300 to drive a 6-meter TE Systems amplifier, about 150 W out, along with a Q5 Systems 222-MHz transverter. This allowed me to set the power level on the rig to about 20 W, which is the right level for both units.

I used the IC-9700 at full output power on 2 meters and 70 centimeters. I also used an ARR preamp for 432 MHz. No need to mount it outside with only a few feet of coax into the rover. This put me on all four bands for the Limited Rover category.



The K5ND/r rooftop-mount construction diagram.



The K5ND/r operating position and table.

Computers — *WSJT-X* and Logging

Computers and software comprise a considerable part of any amateur station. That includes rig control, logging, sequencing amplifiers/preamps, and running *WSJT-X* as well

as chat room software. Rovers have a few other details to keep track of, including changing grids; some systems can do this automatically using GPS data.

I try to keep my system pretty simple. In the past I've used a Mac-

Book Air running *MacLoggerDX* in contest mode and *WSJT-X*. In January I used an HP Windows 10 laptop running N3FJP's *VHF Contest Log* and *WSJT-X*. With both setups, I needed to update the grid each time I stopped.

For the June contest, I used *N1MM Logger+*. I've found it has some nice VHF features, including running two rigs as well as a smooth integration with *WSJT-X*. Plus, it can handle the transverter frequency conversions. The one thing it does *not* do is add a multiplier to the score for each grid a rover activates. You can't have it all.

For the CQ VHF in July, I also added a GPS receiver connected to the laptop via USB and syncs the clock for *WSJT-X* operation. All of this is in line with my desire to provide regular improvements to the operation.

I also try to run VHF-Chat in *Slack* as well as *PingJockey* along with the ON4KST chat. It's tough for me

to keep up with all the activity on those channels, sifting out what's of importance for me and getting my messages into the mix.

I don't usually use APRS to let people know where I'm at because I operate from designated locations that I publish well in advance of the contest. I do use text messages and phone calls on my cell phone. Plus, I always take a screen shot of the grid location from a cell phone app called *Maidenhead* to prove I've been there.

Optimistically, I have a WinKeyer and paddle along just in case I find someone working CW. Yes, I also bring along a microphone.

Not so optimistically, I'll note that RFI can be a big problem when roving. After all, you're sitting in a metal box a few feet from antennas with 100 W or so on them. Snap-on ferrite beads are your friends, as well as a fair bit of testing well before the contest so that you have time to find

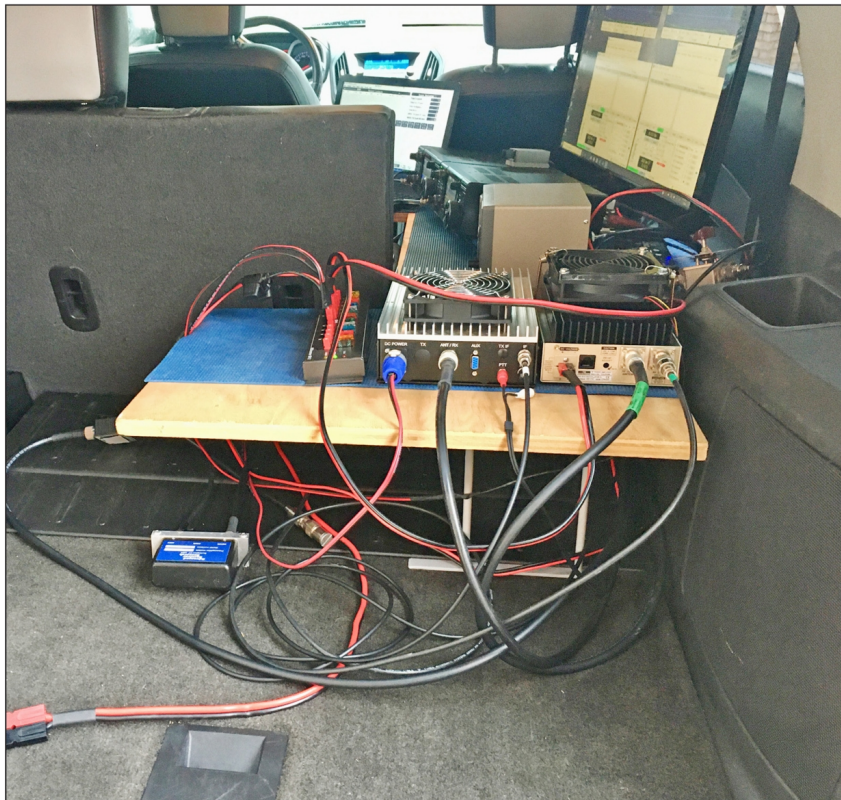
some answers to the problems that crop up before you get on the road.

Power Systems

An absolutely critical part of any rover is the dc power system. I admire those ops with a truck, tower, kW amplifier, and generator. My own station is much more modest and one of the reasons I focus on the Limited Rover category with lower power levels.

I had an audio systems company install a #8 wire 75-A fused run from the battery to the back of the SUV. From there I use a RIGrunner 8012 to route the power to the rigs, amp, and transverter. I try to use the shortest runs possible to avoid voltage loss.

I've considered the power boosters that keep the voltage at a higher level as the battery discharges but haven't made the purchase yet. I will note that I keep the engine running while I'm stopped. I have a not-unreasonable fear that I could stop, do some operating, and not be able to start the car afterward. The engine running helps keep the battery at full charge.



The K5ND/r transverter, amplifier, preamp, and power system.

Your Mileage May Vary

This is one approach among many, many options. The real key is to get started, find out what works for you and your area of the country, and then start making improvements as you learn the lessons of your roads and area of the country.

A 3-minute video of my rover setup and operation for the ARRL June 2020 VHF Contest is posted on my website, www.k5nd.net/2020/06/vhf-rover-video-june-2020-contest/.

Thanks to Scott Wright, KØMD, for encouraging me to document my setup for NCJ. Good luck to you, and I hope to work you on all my bands!

Jim Wilson, K5ND, was first licensed in 1973 and has been VHF contest roving since 2017. He writes a blog about his ham radio adventures at www.k5nd.net.