

K5ND's VHF Limited Rover Experience

Insights that might help your rover journey.

Greg Jurrens, K5GJ, started it with his excellent discussion about VHF roving, "The VHF Contest Rover Experience," Parts 1 and 2, that appeared in the May/June and July/August 2019 issues of *NCJ*. Not only that, but he indirectly started my own rover journey. I'd like to expand upon Greg's superb articles and give credit to him and many other rovers for helping spark my interest in VHF roving.

My Contesting Journey to VHF Rover

My journey began in an effort to move my call sign higher up the list of HF contest results. Advancement called for improvement in equipment, antennas, and operating software. I also started searching entry categories that would maximize my results based on my equipment, skill, and available time. Single-band low-power and QRP entries seemed to be a good fit.

As I ran that process to the point of diminishing returns, I discovered the same thing all over again in VHF contesting. There were new grids to work, smaller antennas with real gain and directivity, interesting equipment, and nifty propagation modes. Closely reviewing the entry categories, I found that the relatively new Single-Operator 3-Band (SO3B) category fit very nicely.

So far, so good. Living in North Texas, however, means that VHF stations are few in number and very far between. You'd work a few stations at the outset of the contest, maybe a few more during the tropo openings on Sunday morning, and pray for E-skip on 6 meters. Occasionally, though, a rover would come within shouting distance, and you'd pick up a new grid and more QSOs. Greg, K5GJ, was one of the first rovers I worked, followed by Andrea, K2EZ, on one of her epic drives across the nation. This piqued my interest.

A trip to the Central States VHF Society conference in Austin, Texas followed, and, of course, I attended the Rover Bowl and saw Greg's rover as well as several others. They were incredibly impressive but they also represented a huge investment in time and treasure. That experience truly brought to life Greg's definition of VHF roving:

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.

That sounds pretty daunting, but more and more the idea occurred that I could set up as a rover and work the dozen or so stations in North Texas that I could hear but also work them again in the next grid. This would help their scores and add to their contest fun as well as my own.

I Become a VHF Rover

I started out simple, because that's my nature. I grabbed my IC-910H, a painter's extension pole, and Diamond Yagis for 2 meters and 70 centimeters. A laptop for logging completed my station. This was for the 2017 September VHF Contest. It was all SSB and a bit of CW. I activated



The initial K5ND rover set up using a painter pole and rooftop straps.



Evolution of the K5ND roving setup, with an improved Fiberglass mast and stand-up operating position.

eight grids and learned a great deal about operating and the stations that I could work.

One thing I liked was getting outdoors, finding the absolute best locations (which I did before the contest on scouting trips), and working some new stations. I also liked that when I'd worked everyone at one stop, I could pack up and move to the next grid. I didn't really need to listen to white noise for very long. Of course, as part of my multi-step program, I needed to pursue improvements. Here's how my station has developed over the last few years.

Phase 1. Painter's extension pole and IC-910H on 2 meters and 70 centimeters with simple Yagis.

Phase 2. Push-up mast, add 6 meters with an IC-9100, employ a stand-up outside operating position, and "Armstrong" rotator.

Phase 3. Roof-top rotator. Add 222 MHz.

Potential Phase 4. Trailer with crank-up tower. Perhaps more bands.

I'm at Phase 3 right now. The roof-top rotator system totally eliminated setup at each stop, and the operating position in the rear seat of my SUV, kept me out of the weather.

Adding 222 MHz to my roving setup was in line with the contest category I've presently settled on — Limited Rover. This category uses the lower four VHF/UHF bands with low power, perfect for my desire to keep things reasonably simple.

My Rover Goals

My most fundamental goal is to keep things simple, although I do sometimes run right past this goal in my enthusiasm for one technical marvel or another. That

goal also helps maintain a reasonable budget that allows for investment over time to develop the station.

So, summing up: Develop your station to fit your interests and skills as well as your budget. All that is measured by how well it optimizes your contest results while determining how the effort is maximizing your fun.

What I like about VHF roving is that it allows me to set up a top-level station on the road in the best locations. This, opposed to a sub-optimal home station that achieves limited results. And, it certainly doesn't require the same level of investment, such as setting up towers with stacked Yagis, purchasing amplifiers, etc., to have a top VHF contest station. Yes, many rovers invest a great deal in their stations and their operations. Plus, all rovers have a gasoline bill at the end of a contest weekend.

I greatly appreciate the big VHF contest stations, though. These are the ones I rely on from one grid to the next to be there for contacts and points. Thank you!

My Rover Approach

K5GJ offered three general approaches to VHF roving:

Stop-n-Plop. Drive to a location, set up your mast and station. Good in hilly terrain and when you can make the setup time payoff with lots of nearby operators.

Run-n-Gun. Omnidirectional antennas covering lots of grids while in motion. Best for flat terrain. Can include small directional antennas on a rotator.

Shoot-n-Scoot. Fixed directional antennas mounted on the vehicle roof (sturdy but requires moving the car to aim the antennas). This approach can be combined with omnidirectional antennas for in-motion operation.

So, I've moved from Stop-n-Plop to what I call Stop-n-Shoot. Essentially, I stop, get in the back seat, and point the antennas. This eliminates set-up time and opens up a few more options for location or even quick stops for new contacts.

While this approach is related to Scoot-n-Shoot, I really don't like the fixed antennas. They do offer the advantage of being solidly mounted to the vehicle, but my roof top mount isn't likely to fly off at higher speeds. I feel fixed antennas work well when you're in a location from which there are a lot of VHF stations to point at once. Here in North Texas, the few stations we have are generally located around the compass at most of my stops.

I've not yet moved to omnidirectional antennas, because I don't anticipate operating in motion. But, this is an excel-

lent option for generating contacts on the fly between grids, and my sense is that it's a winning option as well and probably a must for two-person teams.

I feel there is at least one more approach. I call it Tow-Stop-Crank-n-Shoot. Wayne Overbeek, N6NB, has done this on a grand scale with a trailer that includes a generator and a large crank-up tower. I recommend his website n6nb.com to anyone interested in exploring different VHF roving approaches.

Insight into Power Systems

My first rover power systems involved a sealed lead-acid battery and my IC-910H. I started out by making satellite contacts, which worked well for short contacts. But a VHF rover operation requires power for a much longer time. My approach is to connect the car's power system in parallel with my battery. I also used a small power inverter, dc-to-ac, to power my laptop and charge my cell phone. That worked for my first few rover operations with operations of an hour or two in each grid, recharging the battery between grid as well as at night. I continue to use the power inverter to power my laptop, cell phone, and antenna rotator.

As I contemplated routing large-gauge cables from the battery to the back of the car, I realized that car audio fans do this all the time. I found a suitable vendor, made my simple request, and they set everything up. With their cable I added a RigRunner 8012 to route the 80 A in and route it to all my various devices. The PowerPole connectors work great.

With my Limited Rover operation and only one band on the air at a time, this power system should work fine. For higher-power efforts, I recommend Alan Applegate, K0BG, and his website k0bg.com. He covers all aspects of mobile amateur radio operation, including upgrading car batteries and alternators, along with other topics.

Greg spent some time in his article on safety aspects, given all this power running around your car. My own wake-up call, so to speak, came late one Saturday night as I arrived home to rest before heading out early the next morning. While pulling my portable battery out of the car to charge it overnight, my makeshift battery cable shorted the terminals. Sparks, noise, fire soon followed. First lesson, be careful. This is powerful stuff. Second lesson, take a fire extinguisher along on the road.

Insight into Antenna Systems

I mentioned fixed-mount antennas



A rooftop rotator is added for immediate operation.



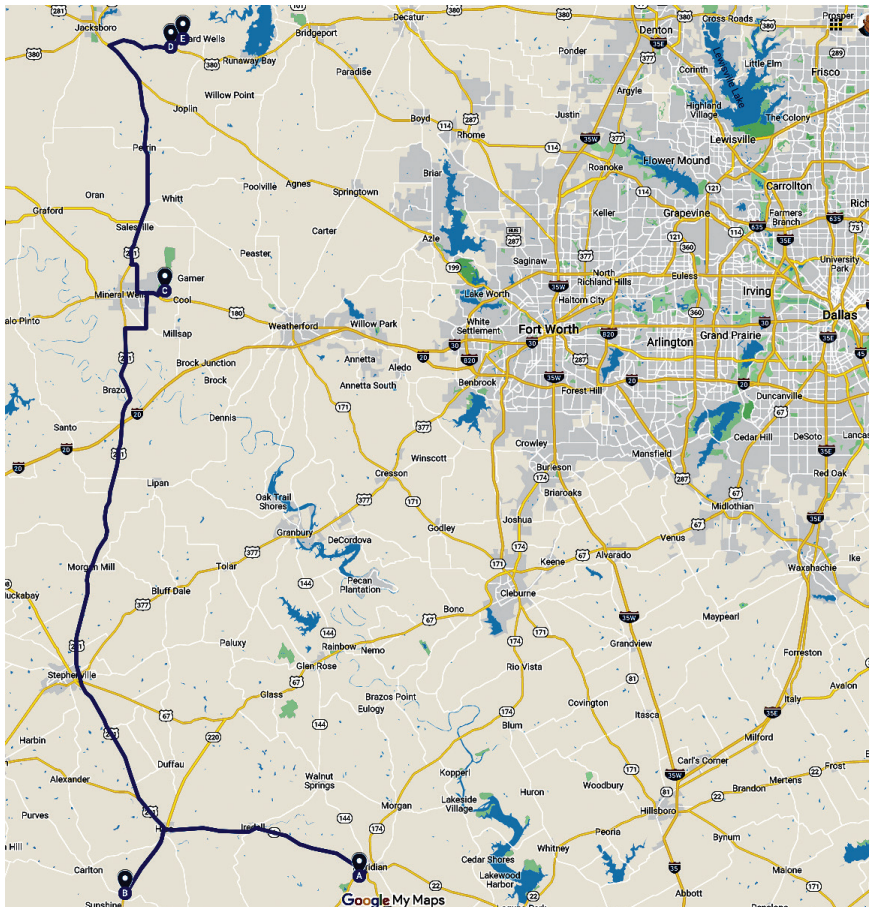
The secret to success is a backseat operating position — out of the weather and ready to go right after stopping in a new grid.

above the roof of your car, using a PVC framework that holds the antennas. It has the advantage of providing lots of room for many antennas. The disadvantage is that you need to move your car to aim the antennas.

I've used push-up masts and Armstrong rotators in many setups. I like the elevation this approach offers and the

ability to quickly point the antennas in the right direction, even faster than with a rotator. The disadvantage is the amount of time and energy needed for setup and tear down at each stop.

The decision to move on to another approach came when the mast fell over as I was setting up in my last grid for the contest. No personal injury, but it did result



Google Map of rover route activating five grids near Dallas-Fort Worth

in bent antennas along with the realization that I needed to try something different. Of course, in a two-person operation or with a trailer-hitch mount, it would work a great deal better.

Where I'm at now is a roof-top rotator system. The platform is built from 2 x 4 rails and cross members along with a plywood deck. The rotator cage uses Steel-Tek pipes and flanges essentially to mimic a three-legged tower. On top is a DX Engineering DXE-AS455G tower shelf and DXE-TB-300 thrust bearing. The first mast was a 6-foot fence post from Lowe's. Now I'm using a 6-foot, 2-inch diameter aluminum tube.

Straps attach the whole thing to the roof rack. I've tested it at up to 75 or 80 MPH with antennas. Of course, wind gusts from trucks going by will increase that force. All told, it's pretty sturdy. For example, I can grab the structure and haul myself up on the deck to work on the antennas.

For cable, I use LMR-400. The short cables required in a rover minimize losses. Even so, I also use preamps for 2 meters and 70 centimeters. I don't bother to mount them at the antennas. The

cables are routed through the window with an insulation tube over the cranked-up window edge to keep out wind and rain. Routing them to the antennas uses cable ties up the rotator cage and mast, including a rotator loop.

My antennas are Directive Systems rover Yagis with 8-foot booms for 2 meters (6 elements), 1.25 meters (10 elements), and 70 centimeters (15 elements). For 6 meters I use a Par Electronics Stressed Moxon, which works great for contesting with a fairly wide beam width, plus it fits well atop the rover.

Antenna separation is always part of the discussion. In this system, there's about 12 inches between antennas. With low power, that works well, and isolation isn't a problem. I've read papers that spell out "required" distances between antennas, but at least one of these said to "work with the space you have." I agree.

Most experienced rovers advise to place the 6-meter antenna on the top of the mast. That makes sense, although I'd like to have the 2 meter beam as high as possible, as that's the go-to band for local contacts, followed by moving the station

to other bands. Of course, there are always trade-offs with any rover setup.

Insight into Radios

My rover operations started with an IC-910H running 2 meters and 70 centimeters but have since upgraded to an IC-9100, so I could add 6 meters. While I also have 23 centimeters on that rig, I prefer to concentrate at the moment on the four low bands for Limited Rover entries; 23 centimeters may come in handy for the UHF contest.

For 1.25 meters, I'm in the process of adding a Q5 Signal/DEMI transverter. This is the 25-W version that I intend to use to drive an amplifier to achieve the 100-W level for the contest category.

What I like about the IC-9100 is that it has two outputs for HF, so I can use one for 6 meters and the other for the 28-MHz transverter IF. It offers separate outputs for 2 meters and 70 centimeters.

My overall approach is to set the rig at 10 W output to drive the 1.25-meter transverter as well as 6-meter, 2-meter, and 70-centimeter amplifiers, all to run power levels up to the contest category limit of 200 W on the lower two bands and 100 W on the upper two bands.

Other options for rovers include antennas switches to route the rig input/output to different transverter setups. Greg covered this very well in his article. He also noted that the IC-706 is an excellent choice for those starting out in roving. I've also seen the FT-991 in operation with several rovers. Bottom line: Use what you've got and get out and get started learning more about roving.

Insight into Computers and Software

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

My system is pretty simple. On my Apple laptop I've used *MacLoggerDX* in contest mode and *JT-Alert* with *WSJT-X*. I do have to manually update grids as I travel. I'm now moving to a Windows laptop where I'm using N3FJP's *VHF Contest Log*. Here again I need to manually update the grid. I'd like to use *N1MM Logger+*, but it doesn't do rover scoring. I've looked at *RoverLog* but haven't put it to use yet.

I use a simple USB sound card for the rig interface, but a lot of options are out there. I also use the rig's internal keyer

and a small paddle for the few times I need CW.

Insight into VHF Rover Modes

A big aspect of rover operation is finding another station, usually on 2 meters, and then moving it to other bands for additional points. This typically takes place on SSB, where you can more easily direct stations to other bands and frequencies.

Then *WSJT-X* came along to disrupt this operating practice while revolutionizing weak-signal work entirely. *JT65* was amazing, but slow. FT8 is absolutely fantastic. MSK144 really works when other possibilities won't. But there's no way to send messages seeking band changes.

The introduction of *WSJT-X* NA VHF Contest Mode created some turbulence for not including provisions for /r call signs. Version 2.0 made up for that, and we'll see if FT4 will make a difference in VHF contesting.

I certainly love the *WSJT-X* modes for weak-signal work. We'll just need to see how we can generate QSY band-change requests and encourage moving to SSB when the band really opens up for running stations.

Insight into Rover Routes

Rover routes are all about grids — how to maximize the number of grids activated while limiting the mileage driven. For me and my Stop-n-Shoot approach, miles driven represent time that I'm not on the air.

Since a grid in the US measures roughly 70 miles north to south by 100 miles east to west, I try to plan my routes running north and south where possible. This reduces the number of miles required to get from one grid to the next.

I also try to set up my routes around grid corners, where four grids merge. That allows quick drives across four different

grid boundaries. My June 2019 VHF rover routes in the Texas Panhandle really took advantage of this type of routing.

Some rovers head out with only a general idea of their route. I always scout out my routes and find the best locations to set up my rover. First, I work with one of the grid mapping applications. Online topographical maps and summit information can prove very helpful too. This helps me set up the best route for limiting travel time.

Second, I get out on the road and locate exactly where I can park and point the antennas. I look for clear horizons and higher spots without trees. That's easier to do in Texas than in many places. Then, I take GPS snapshots of the location to help me with mapping and to verify I'm in that particular grid.

I'll also note that I pay particular attention to overhead tree branches on my routes. While my rover is only 12 feet high, trees can and do reach out and snag your antennas. That makes yet one more challenge for contest weekends and can bring your efforts to a sudden disappointing halt.

Communicating Your Plans

A big part of any rover effort is to let other operators know you're out on the road, so that they watch for you and point their antennas your way. Here's what I do before each contest:

- ◆ Build a Google Map with the exact route. Add it to a blog post with a listing of expected times at each grid along with station details, including bands, antennas, and power. (I use that same map when driving the route.)
- ◆ Announce this same information, with a link to the blog post, to online VHF and Contesting Groups, both national and local.
- ◆ Build your own email list of those you've worked in previous contests, and

particularly big contest stations. Route this same information to them.

Randy Wing, NØLD, does an incredible job with his communications. Not only does he do all the above but also reaches out around the year to speak at hamfests and club meetings about roving and how to work VHF contests. He further works a great deal to prepare local FM-only stations, picking up QSOs as he drives by.

Communicating During the Contest

With new VHF contest rules introduced a few years ago, lots of communication options are available during the contest. Chat groups are extremely helpful. This includes PingJockey, VHF Slack, and ON4KST chat. There is also APRS spotting to help stations follow your route.

I also use text messages and even phone calls. In some cases I'll text a station that I've arrived in a new grid. In addition, I receive messages from some stations and other rovers inquiring about my current location. Phone calls I usually reserve for a few big contest stations right before I depart a grid, if we haven't yet worked each other.

You may arrange schedules and initiate contact efforts, but you can't reveal QSO details via any of these communication channels. Make sure you restrict your efforts to setting up QSOs.

YMMV: Your Mileage May Vary, Literally

This is your rover journey. Do what works best for you, your goals, and your locality. For example, I prefer solo radiosport, but many others enjoy working as a rover team or even as part of an extended effort with several rovers.

That's the fun of amateur radio — finding what works for now, and then finding the next thing. But the first step is always to get started and get on the air. I certainly hope to add you to my log in future contests.