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# The VHF-UHF Contest Rover Experience — Part 1

When invited to submit this article, I was ready to launch into an informative "how to" article that included all the well-known tricks and secrets of roving. In researching, I rediscovered a wealth of information online, mostly maintained by the big VHF clubs[1]. I also found an interesting history of VHF Amateur Radio by Kevin Kaufhold, K9GKA[2]. Did you know hams have been contesting on "The Ultra Highs" since 1927? So, I'll focus on my experiences in this great ham radio hobby niche of VHF roving.

**Humble Beginnings**

First, a quick 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." It's really much more than that. It's a contest mode, a technical challenge, a social event, and mostly just a lot of fun.

I got started roving in about 2000 after moving to Austin, Texas, from the Dallas-Fort Worth area. I wanted to be able to talk with my friends up north but hadn't had time to put up decent VHF antennas. The June VHF Contest was happening, so I decided to throw some antennas and a radio into my car and find a hill. My neighbor Joe, K5FOG, and I used a TV mast, a stepladder, and a pair of beams for antennas. We used a quarter-wave whip for 6 meters. Of course, neither of us knew where to call CQ on 6, but we tried. At least we knew that the antennas need to be horizontally polarized and that most QSOs are on CW or SSB. (Digital is becoming very popular too.)

We used a single HF/VHF/UHF multimode mobile rig, so band changes required disconnecting coax. More than once we coordinated on VHF and then forgot to connect the proper antenna for other bands. Suffice to say, our performance was less than stellar. But I was hooked. I realized two things about VHF roving: First, it takes more than same-day planning to be successful. Second, and most important, even a bad day out roving is fun.

I operated with my ladder, pole, and beams for several contests. Each time I added something, it came to be important. A simple four-port coax switch made a world of difference in antenna management. I found that bolting the stepladder to a trailer with the beams already mounted to the pole made for quick setup at a new site.


**Figure 1 — Multiband mobile used for early roving attempts.**

And actually studying a topographic map to see where the high spots were located cut out some random driving.

I mention my early attempts to illustrate how easy it is to get into VHF roving. A single radio, a few bands worth of antennas, and a yellow notepad to keep score are the basics. The rovers refer to this setup as the "Joe 706-Pack" in homage to the popular all-band Icom IC-706. In recent years, the roving community even pushed for the Limited Rover category to encourage more hams like Joe and me to get out and discover roving[3]. This is a great place to get started. By partnering with other rovers on the field of battle, the mutual outcome is better than going it alone. Besides, it's just more fun.

I'd seen some Big Gun rover rigs at a Central States VHF Conference[4] and decided I just had go for it. But first, I had to decide which kind of rover I wanted to be. Turns out, in addition to Joe 706-Pack, there are several more popular roving configurations, driven largely by geography, operating style, and the number of active bands.

**Stop-n-Plop**

My early attempts at roving were a modest version of the Stop-n-Plop method (see Figure 2). This is where everything

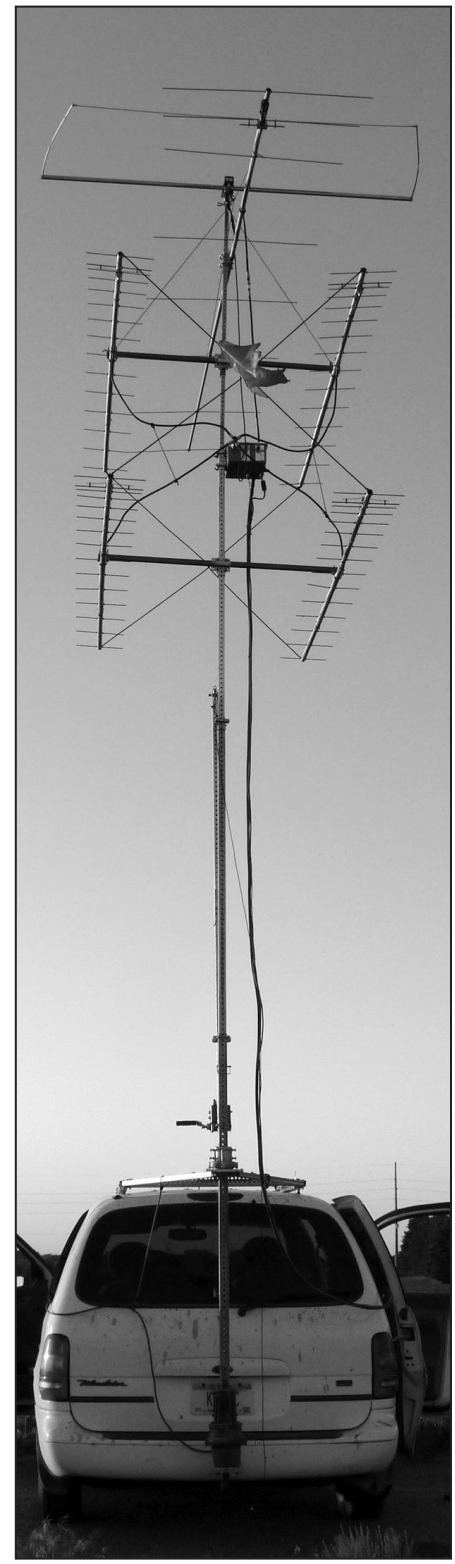

**Figure 2 — Stop-n-Plop Rover: KØMHC.**

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is stowed in or on a vehicle, driven to a good location, with setup following to get the station operational. I've seen some very elaborate Stop-n-Plops that involve pneumatic masts and crank-up towers on trailers. Stop-n-Plop is great for hilly terrain with tall trees. It also seems to work well when there are lots of fixed stations making it worth the set-up time — think East and West coasts. The advantage is obvious: Height. The disadvantages are increased complexity, cost, and some potential safety issues. If you get serious about Stop-n-Plop, look around for a good deal on an old news van or retired public safety trailer.

**Run-n-Gun**

Run-n-Gun roving is very popular in the Midwest where there aren't many hills or fixed stations. A Runner will typically use omnidirectional antennas directly mounted on the vehicle (Remember: Horizontal is the polarization of choice). The more sophisticated rigs will also use a short mast and a rugged rotator to turn several short beams on the higher bands (see Figure 3). This is where some serious mechanical design considerations come into play. Remember that to drive on the highway your vehicle can't be taller than 14 feet nor wider than 8-1/2 feet. Plan to get out your math books to predict wind loads at 80 miles per hour, lest you risk raining aluminum all over the highway. Run-n-Gun has the distinct advantage of being able to cover many grid squares over the course of a contest. This roving method has produced some great results including the legendary June 2001 K5UHF/r 36-grid run from Minnesota to South Texas, and 20+ grid runs by a team of West Coast Run-n-Gun rovers led by N6NB/r.


**Figure 3 — Run-n-Gun rover: K5UHF (SK) and NG5V.**

**Shoot-n-Scoot**

Another popular configuration is the Shoot-n-Scoot rover (see Figure 4). This roving setup mounts the antennas to the vehicle in a fixed direction, usually facing forward. The name comes from the action: Drive to a spot, point at the distant stations one area at a time, shoot the contacts, then scoot on to the next stopping point. Shoot-n-Scoot has a mechanical advantage over Run-n-Gun in that the antenna mount can be sturdier to withstand the beating beams take on the road. As a result, larger or longer beams can be safely incorporated. Shoot-n-Scoot allows you to use multiple mounting points to cut down on the flapping metal.

The fixed rack has a few downsides though. First, any sort of rover "rack" is going to be noisy. Bolting it to your luggage rack makes a great way to transmit all that noise into the cabin. Second, it's difficult to assemble a Shoot-n-Scoot rack out of a non-conductive material that has sufficient strength. Most Shoot-n-Scoot types started with PVC pipe, because it's cheap, and repair parts can be found widely. PVC is not ultraviolet friendly, so you shouldn't leave your rack in the backyard between contests. In Texas, the sun will kill a rack in less than two seasons. Before you get the idea to paint your PVC, make sure you use a plastic-safe paint; I watched a brand new rover rack melt when the paint reacted with PVC pipe.

PVC also has a habit of taking on a memory. If it sags a little today, it will sag more tomorrow. We found that for high-load spans, you can insert a curtain rod into the PVC pipe and then use expanding foam to hold it in place. Last, Shoot-n-Scoot is really hard on your vehicle's steering. The power steering pump becomes the rotator and the linkages the torque arms. I went through three power steering pumps on my last rig over its 10-year roving life.

**Plan for Expansion**

No matter which roving method you choose, if the roving affliction really hits, you will want room for every band from 50 MHz to 24 GHz. Most serious rovers run six to ten bands. Dishes are typically used above 3.4 GHz, and they can be mounted or stowed. The proliferation of wireless ISP antennas has made 2.3- and 5.7-GHz antenna selection easier. A converted small satellite dish makes a perfect 10-GHz radiator. Why build or buy when you can scrounge from your neighbors' junk pile?

I've also found that, in addition to beams, mounting stacked omnidirectional antennas and some power on the lower bands (50 – 220 MHz) gives the ability to make meaningful Run-n-Gun contacts on the way to the next Shoot-n-Scoot grid stop. Most rovers use horizontal loops or squalos. If you are new to mobile VHF, you may not have heard of the squalo. Unlike a loop, the squalo is actually a bent dipole formed like a square. This sturdy shape gives almost the same performance as a loop yet makes it easy to mount on a vertical pole or somewhere on a rover rack. Stacking loops and squalos will gives a roughly twice the gain over a single omni. Remember it's all about effective radiated power. Amplifiers are fun to install, but they are expensive and can be cranky in a mobile installation. Antennas are by far the best dB output/dollar spent.

**Antenna Isolation**

At some point antenna isolation be-


**Figure 4 — Shoot-n-Scoot rover: N5AC/r and K5GJ/r.**

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comes an issue for radio protection. It's very important if you start running significant power on the lower bands to perform some measurements on the other antennas to make sure you aren't coupling too much power back into your other radios. A 4-foot loop Yagi for 3.4 GHz can couple several watts of power into the front end of an expensive microwave preamplifier. A simple inline wattmeter or good power meter will tell you what you need to know. I have had to move loop Yagis well away from the 144-and 220-MHz antennas.

Pro tip: Those ubiquitous VHF diplexers and triplexers people are fond of using on FM mobile rigs work in both directions. I run 300 W on 144 MHz and have measured up to 5 W coming back through the 50-MHz squalo to my radio. I connected the HF/VHF diplexer common port to the to the 50 MHz omni antenna on my rover. I connected the 6-meter radio to the HF port, and then connected a small dummy load to the VHF port (see Figure 5). The excess power at 144 MHz coming down the coax now gets routed to the dummy load, while the 50-MHz signal passes right through. Problem solved!


**Figure 5 — Using a diplexer to improve band isolation.**

So far, all that's been discussed is the antenna side of the equation. The good news is that the radio side is generally straightforward. Remember Joe 706-pack? Those multiband HF/VHF rigs work very well, even in a sophisticated rover setup. I quickly discovered that having a dedicated 144-MHz radio is key to consistently making rover contacts. It's one of the best propagation bands, it's the generally accepted coordination band for making UHF and microwave contacts, and it's the "comms channel" for chatting with nearby rovers in the middle of the night on the way to the next stop.

### The World of Transverters

When I felt the need to move up to multiband, I quickly discovered the world of transverters. A transverter converts an intermediate frequency (IF) to the desired band (RF). Much has been written on transverters, so I will simply state that you should pick an IF frequency or two, pick an IF power level, and stick with it. It keeps the interconnection plumbing simple. I have transverters for 220 MHz through 10 GHz (excluding 432 MHz, where I use my "Joe" radio — see Figure 6). I generally use 144.1 MHz for an IF, so that if all else fails, I have other radios I can press into IF service. I built all of my transverters. Most were kits, but those for a couple of bands were totally homebrew. It was very satisfying to make a 270-mile 10-GHz rain-scatter QSO with a rig I built from a salvaged radar calibrator and a sat dish (see Figure 7).

I also understand that not everyone likes to build. Happily, there are several transverter manufacturers out there who will work with you to be successful. Most transverter makers are also avid VHF contesters. Hamfests and local VHF clubs are other great sources of used and cheap gear.

A note about 50 MHz: I got into roving during the last sunspot cycle, and 50 MHz could be lots of fun when the E-skip propagation rolled in during a contest. In fact, it can be too much of a good thing. When 6 meters opens, the rest of the VHF-and-up bands become a ghost town. I yelled and screamed that 6 meters shouldn't be part of a VHF contest, but ultimately I gave in and added a separate radio for the Magic Band in the vehicle. Now, if 6 meters opens up, I can get in on the action. I'm almost always running with an operator-partner in the vehicle, and his job quickly turns to making 6-meter contacts.

Why not just skip 6 meters? Because each new grid worked is a score multiplier. A solid 30,000-point score can become an amazing 100,000-point score with one good opening on 6. You decide.

Part 2 will delve into the topics of plumbing, power, and safety.

### Notes

[1]**http://www.arrl.org/find-a-club**
[2]**https://sparks31wyo.files.wordpress.com/2018/08/on_the_ultra_highs.pdf**
[3]**http://www.n5ac.com/VHFSurvey.pdf**
[4]**https://www.csvhfs.org/**

**Figure 6 — K5GJ/r transverter mounting.**

**Figure 7 — K5GJ/r and WD5IYT(SK): First 10-GHz rain-scatter contact**

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