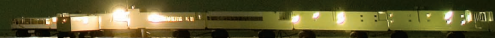


Polar Bear Portable

Imagine traveling to the far-flung reaches of the frozen north to explore the world of HF from a self-contained complex of metal buildings towed-out onto the remote Canadian sub-arctic tundra. There's nothing quite like auroral zone DXing while outnumbered by hungry 600 pound predators.

David A. Rosenthal, N6TST



The setting was the southern shore of Hudson Bay, about 25 miles east of the tiny northern Manitoba town of Churchill (58° 45' N, 94° W). Territory here is classic tundra: flat and rocky, spotted with small lakes, patches of low scrub and 6 foot evergreens that only have branches on their downwind sides. Snow pretty much covers everything by late September, and from October into December, the attraction becomes the large population of polar bears gathered near the water waiting for it to freeze so they can amble out onto the ice and hunt seals. It's then that adventurous travelers flock to Churchill, braving frigid temperatures and howling winds to watch the bears from special high-wheeled vehicles called "tundra buggies."¹ To accommodate visitors, a couple of tour operators set up temporary bear-proofed-but-comfortable facilities way out on the icy plain; one of them, the "Tundra Buggy Lodge," is where my travel writer wife Donna, KF6ZVE, and I stayed.

Like me, Donna came to write an article about the bears. But I wanted to include radio, since the past several years have enabled us to assemble a suitcase-portable mobile system we take to exotic locales to make our exploration more complete. Bears or no bears, operating HF from a radio-isolated location at the fringes of the densest regions of the Auroral Zone is always more than a little intriguing.

The Tundra Buggy Lodge looks like a train, linking up a set of trailer-like buildings mounted on 5 foot diameter wheels to keep everything and everyone out of reach of the bears. It has two sleeping cars, a lounge car, a kitchen/dining car, plus modular utility units with propane-fueled generators and support equipment (Figure 1). Delightfully, it's all covered with 1/8 inch thick aluminum sheeting and, to the cleanly coupled antenna, presents a superb counterpoise. The Lodge owner, Merv Gunter, gladly helped by bolting a metal tab to a roof edge that would accommodate my homebrew breakdown travel antenna.

Made from two sweat-soldered, screw-

coupled sections of copper water pipe, the 4 foot antenna's base rod is capped with an aluminum block drilled and tapped for as many as five manually tunable resonators from a Spider mobile antenna. This makes it a multi-band vertical with astonishing versatility. With an efficient RF ground, small top-loaded HF antennas like these (mine stands about 5 feet high) have lower signal takeoff angles, and thus deliver better DX performance—very handy in genuinely remote settings.

The rest of the station, an IC-706Mk2g transceiver, MFJ-4245 switching power supply and a RIGblaster Nomic sound card interface for my laptop, all tucked easily away in the suitcases with headroom to spare in allowable baggage weight. As always, I'd tune the antenna manually, using the unique internal "Plot Measurement" feature of the '706 that samples a chunk of band and displays where your antenna's SWR dips.

The jumping-off point was Winnipeg where I'd been in touch with Gord, VE4GLS, District Emergency HF Coordinator for ARES Manitoba. We'd arranged to meet on

¹Notes appear on page 49.

a local 2 meter repeater when I arrived. Gord told me that, as far as he knew, there hadn't been any hams up in Churchill for years. He was always interested in how useful 20, 40 and 80 meters might be from that region.

Early the next morning, a 50 passenger commuter turboprop carried us the final 600 miles to Churchill, dropping through a hole in the low overcast to scud-run the last 30 miles or so (nothing higher than a few dozen feet in *this* neighborhood). A bus took us another 20 miles to an elevated platform "launch" facility and we began the final hour-and-a-half creep to the Lodge in a tundra buggy, a well-heated wide-bodied mobile room, built on a four-wheel-drive five-ton commercial truck chassis and powered by a 460-cubic-inch diesel V8. A few minutes out, we encountered our first polar bear; we'd probably seen a dozen more by night-fall when we pulled up to the Lodge.

The spot that looked best for my temporary station was an unused table in the dining car, right next to the door leading to the open-air gap between it and the lounge. A 6 foot ladder waited near the aluminum strip they'd installed for my homemade C-clamped, all-angle antenna mount.² In a few steps, I could zip outside and get to my antenna mast with its Hustler quick-disconnect base (Figure 2).

Experimenting with Propagation

One of this trip's primary goals was to evaluate the performance of a couple of free HF propagation prediction and modeling resources available online. In the often strange-acting ionosphere over that part of the planet, there's nothing better than an actual test to see how what they forecast ultimately compares with reality.

To prepare, I used the Real Time Space Weather page I maintain on my Web site (www.ridgenet.net/~n6tst). There, I have direct links to Australia's Ionospheric Prediction Service (IPS) Radio and Space Services Center where anyone can access

a host of amazingly useful free online HF propagation tools. Inputting your own geographic coordinates, you can either predict future communications paths or take advantage of IPS' real-time ionospheric data to see if one exists at that very moment.

The other player was *W6ELProp*, a freeware HF propagation prediction program by Shel Shallon, W6EL.³ I've used Shel's conveniently sized, amazingly feature-packed application for years and continue to be impressed by everything it offers. My plan was to team up the predictions from IPS and *W6ELProp* to see if I could produce a reliable picture of what to expect.

I modeled HF paths from the sub-arctic tundra, using *W6ELProp* (based on the NOAA Space Environment Lab's solar flux projections during our visit). I blended in what IPS' applications predicted about coverage in my target regions and how the bands might perform. Results consistently showed easy paths to the bulk of the US and decent ones to the Pacific, but Europe always came up as "can't get there from here."

As never seems to fail with HF communication, what actually happened was a little surprising. But that's jumping ahead of the story.

Getting Going

The next morning, station assembly moved smartly. With my C-clamp and mount, antenna installation took three minutes (two of them spent warming my fingers from the 12°F cold) plus, while running up

and down the ladder to tune resonators, stopping to look when I heard anxious shouts of "bear!"

All around—I mean *all* around—polar bears converged on the Lodge as the tasty fumes of breakfast tumbled right to the snow in the frigid morning calm and spread quickly. About half a dozen had assembled beneath where I'd set up my antenna, with several nonchalantly observing this odd-appearing animal tussling with some kind of stick. It was then that I realized dropping *anything* was not an option. I made sure of

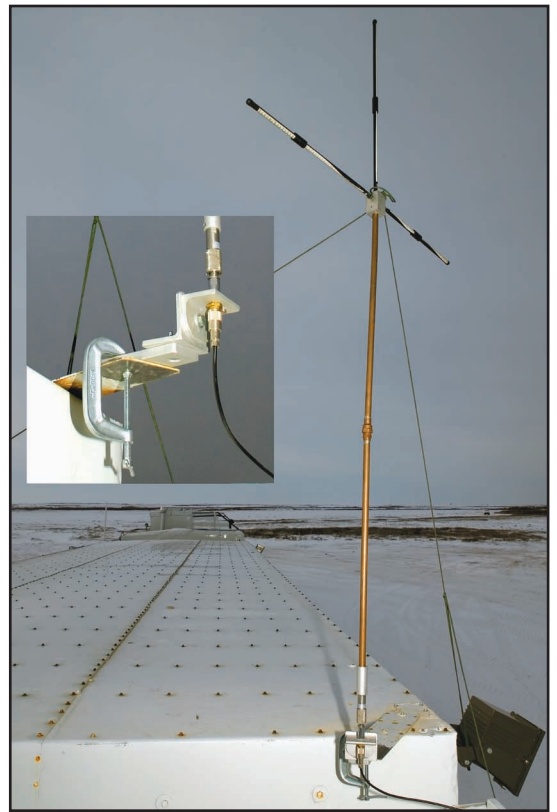


Figure 2—The author's antenna and all-angle mount (both homemade) uses a C-clamp to attach it to an aluminum tab bolted to the roof. See text for a description of the antenna.



Figure 1—The Tundra Buggy Lodge is an assembly of high-wheeled portable buildings towed out onto the flat, frozen shores of Hudson Bay to accommodate visitors during the October-November polar bear-watching season. The author's antenna stands just to the right of center.



Figure 3—Dennis Compayre, owner of Polarbearcam.com, provides continuous streaming video of polar bears via his tundra buggy's camera and a satellite link to the Internet.

the knots on my nylon parachute cord wind guys.

A little after 10 AM I flipped on the γ 706. The bands sounded wide open! At 18 minutes past the hour, I checked the Geophysical Alert Broadcast on WWV: a flux of 138 and a quiet geomagnetic field. Nice! The “going” estimates that drove all my predictive homework assumed a flux of about 100. If this kind of margin kept up, HF could get interesting indeed.

On 20 meters, I heard Dave, N7WW, in Wickenburg, Arizona, taking check-ins for the Clamdigger Net. I jumped in and we both shared a flawless 5/9 path. It just got better from there. Copy with John, AI6A, my California hometown sked partner, was perfect as predicted even with the lower flux value. My sked with Des, ZK1DD, in the Cook Islands was noisy but we heard each other.

More of the day proceeded well with openings on every band. Europe, predicted as a solid “no show,” boomed in as a strong performer on 15 meters with a 5/8 contact with Christian, OE6NVG, in Austria.

Polar Bear Cam

Dragged from the radio by Donna for a tundra buggy tour of the surrounding area, I argued at first but what I experienced had a fascinating impact. Polar bears were nothing like the bears I'd seen both in zoos and in the wild. More like they'd been drawn by Gary Larsen of Far Side fame, their easy-going manner defined “cute” and, with their playful antics, proved irresistible.

Moreover, they were essentially everywhere, lazing in the brush or wrestling in the snow. It didn't take long to become accustomed to having one or two just sitting there watching or napping. This kind of wildlife environment is utterly unique and I can see why visiting this isolated part of the world

during this time is so popular.

But, too, I soon discovered that isolation to be an illusion. VHF radio links the Lodge, all 12 of its tundra buggies, the launch facility, and the Churchill office with full-quieting FM copy. And that was nothing compared to the Polar Bear Cam.

Tundra Buggy #1, the original 1979 prototype, now sports an articulated infrared-enhanced Pelco video camera, complete with IR illuminators for nighttime. Inside, Polar Bear Cam creator and Churchill native Dennis Compayre roves over the area, constantly nudging a joystick to follow the bears. An onboard computer and server streams the video via a 2.4 GHz RF link for relay through a Lodge-based satellite dish (Figure 3) to the Internet (14 GHz up/12 GHz down). During the October-December polar bear season, a \$25 subscription delivers access to Dennis' continuous, live 24 frame/second polar bear video direct from the Buggy. At www.polarbearcam.com, there's also a free still image that gets updated every 20 seconds.

After watching me operate HF for a while, Dennis invited me to ride along. We spent a lot of time together since he knew where all the bears liked to hang out and I could use a little of his Internet bandwidth to keep track of what the ionosphere was up to.

Once night fell, I braved the 30 knot wind and 10°F temperature to install my 80 and 40 meter resonators. Inside, I listened carefully, noting the frequencies of stations I wanted to try since small mobile antennas have very narrow transmit bandwidths at those long wavelengths. This meant some delicate resonator tuning and, when it's that cold, each trip outside to make a tiny tweak gets decidedly decreasingly enjoyable.

But three hours after sunset, I could still hit stations in the southern US on 40 and, on 80, as far away as Washington state, Maryland and Texas. In California, I'm a

member of the Golden Bear Net (3.975 MHz nightly at 7 PM Pacific Time) and could just make out a few stations checking in.

Europe Booms In

The following morning, sunrise (after 8 AM there that time of year) found me sipping coffee and marveling at how well Europe was coming in on 15 meters! The wind had stopped and the sky cleared, allowing it to get yet *colder*. I scurried up my ladder and installed my 20, 15, 12, 17 and—did I dare?—10 meter resonators.

It took a series of trips up and down to get everything tuned and I couldn't help but notice my white-furred audience. Between shooting pictures and entertaining them, I'd already learned something quite useful: Bears don't stare. Instead, they systematically survey the scene from their comfortable spot, constantly checking objects of interest. This means whether you're running up and down an icy ladder or waiting to punch off a shutter, you're never far from solid eye contact. If you're crafty and within a few feet (and at the Lodge, you always are), you can surprise a coal-eyed friend by shifting your gaze to him just as he shifts his to you. Reactions and facial expressions vary but there's no doubt you've established communication.

Back inside I wrapped around a coffee cup and listened to the higher bands sing. Flux had climbed to 140 and everything was hot, hot, hot! I bounced from band to band, easily making contacts I'd never expected: Scotland on 20, Belgium on 17, Finland on 15, Germany on 12 and every corner of the US on 10. I plugged in the Nomic and cranked up PSK31; it was a picket fence on 14.070 with solid copy. My hometown sked with California on 20 was great and the SSTV polar bear image I sent (see Figure 4) went across closed-circuit.

Meanwhile outside, bears had staked the place out. I'd finally grown accustomed to seeing them everywhere I looked (Figure 5).

That night featured a total lunar eclipse accompanied by a delightful miracle when the ever-present clouds disappeared completely. With the moon slipping into the Earth's inner shadow to become a deep copper-red disk, the aurora began as a glimmer and then exploded into a stunning display. Brilliant green from oxygen atoms more than 60 miles up being excited by incoming solar wind particles, the glowing curtains slowly rippled about 300 miles to our north. Back inside, midnight came with 20 meters still humming with Russians and a few JAs; PSK31 remained solid on 14.070.

The next day brought more rewarding, all-band operating but after a few hours, it was time to disassemble everything and pack for

the return to the real world. Back in Winnipeg, even temperatures in the mid-40s felt snug and warm, then walking off the plane in the shirt-sleeve weather of Las Vegas made life among polar bears seem even farther away. By day's end, I sat in front of my home computer going over pages of logged contacts while loading seven CDs filled with digital images.

Sorting It Out

Not sure where to begin, I checked the archived solar-terrestrial measurements from our time in the sub-arctic and reapplied those higher flux levels to the HF propagation prediction models I'd used.⁴ Remarkably, I found better than a 90% correlation with the contacts I made. Reexamining my original, more pessimistic printouts, I could see scaled-down indications of predicted paths but with lower signal-strengths and S/N ratios.

Long-term predictive plots of solar flux display a range of values but what the sun delivered during this trip topped even their high end (for example, 140 vs about 123).⁵ So Lesson-Learned Number One told me a good idea is to plug in the prediction's best-case number and see what paths might open.

Also, both the IPS and *W6ELprop* software packages proved themselves not only highly accurate in this tricky radio environment, but also complemented one another. For example, on a given path and frequency, both IPS and *W6ELprop*'s predictions provide radiation takeoff angles for the circuit. If you know your antenna's takeoff angle, you can better determine what to expect. If you don't, trying some skeds on the same path but different frequencies might provide a way to see what your antenna's characteristics really are. Just as we now use all of today's computing power and sophistication to try and predict what nature will deliver, this can be an excellent way to turn that process around and use the ionosphere itself as your measurement tool. No matter what, developing this kind of savvy is what keeps HF communication in the "art form" category.

As far as traveling with my gear, this challenge was eased by giving the airport



Figure 4—The N6TST/VE4 QSL card.



Figure 5—The author works DX, guarded by a napping polar bear.

security folks a friendly heads-up about the presence of odd-appearing electronics, rods and cables woven through the luggage. Putting strange objects like mounts and mikes in transparent bags reduced the need for inspectors to dig or unravel. A new padded product from **PowerPortStore.com** called the "Radio Box" is made just for holding a compact transceiver-based portable station. It fits flat and snug inside a suitcase and is one of the handier ways to keep gear from spreading out.

Though I thoroughly enjoyed my HF communication, the connections I had with our polar bear hosts turned out equally rewarding. I'll never forget sitting at the wheel of Dennis' Polar Bear Cam buggy and catching the roving gaze of a 500 pound young adult male bear shifting from paw to paw just beneath my open window. Effortlessly, he stood up against the

body, putting our noses about a foot apart. Several seconds of deep eye-to-eye contact passed between this odd acting, funny smelling animal and the bear. These guys have dog-type noses (but maybe three inches across) and his sniffed and moved constantly. He radiated curiosity and perhaps a little humor but absolutely zero threat. I now see how people develop a particular affection for polar bears. But then, too, I'm glad I resisted scratching him a little behind an ear.

Where the Bears Are

As far as radio-equipped, far-north exploration goes, I wholly recommend it. While risks of Auroral Zone HF disruptions exist, they're relatively rare and, if you're a true HF aficionado, you know there will always be *some* bands and paths open. I'd suggest winter's "shoulder seasons" because you still have good nights and better shots at seeing the aurora. If you want to meet polar bears, Churchill is the place but you have to either fly in or take a two-day train trip from Winnipeg (its own adventure, I understand).

All in all, I'd do something like this again in a heartbeat. Roads to northern Canada are good and wide open with friendly hams all along the way. Take your HF but realize your cell phone won't be too useful once you're out of

town. And if you want to go to Churchill and meet polar bears, I know a place that already has an antenna mount.

Notes

¹See www.tundrabuggy.com.

²For construction details, see Portable in Paradise: Cruise Ship DXing, *QST*, Feb 2003.

³*W6ELprop* is downloadable free from www.qsl.net/w6elprop/.

⁴Archived solar-terrestrial indices are available from www.sec.noaa.gov/weekly/index.html.

⁵Forexample, science.nasa.gov/ssl/pad/solar/images/f107_predict.gif.

All photos by the author

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