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Sustaining PJ2T for the Next Decade

I had the opportunity to see Geoff's presentation on PJ2T at Dayton Hamvention 2011, and he graciously agreed to share this story with NCJ *readers. While I have taken it for granted that PJ2T would always be there on multiple bands in each year's DX contests, I did not realize how much hard work has been necessary to keep this station on the air over the years. The contest community owes Geoff and the many people who have helped him over the years a debt of gratitude for their personal sacrifices. — Al Dewey, KØAD*

Figure 1 — Keith, WA9S, running 10 meters at PJ2T station #2 in the 2010 ARRL International DX CW.

What will it take to keep PJ2T on the air for another decade? The devil is in the details, of course. PJ2T is in its second decade of high-volume contesting, and the 25 members of the club now face the challenge of keeping up with the detailed, frustrating dirty work needed to sustain the station for another 10 years.

It's heady, fun stuff, running multiop rates that can exceed 1000 contacts per hour while gazing out at the 85° turquoise Caribbean Sea — especially when it's –10° F in New England, and the snow is three feet deep in Buffalo. We've posted quite a few #1 world wins over the past decade, including a couple of new world records. You might be surprised to learn, though, that we owe our success not so much to big aluminum, proficient ops or a magical location as to being good at sanding, grinding, scraping, digging, painting, cleaning and filing. This article will give you a taste of what we've been up against in order to be able to deliver snappy "599 9" reports so many times and to so many stations — and what we'll need to keep doing it in the future.

The Beginning

When we bought the W1BIH/PJ9JT site in 2000 the initial concept was to start small and see what happened. Some radio assets already were on site: A 50 foot tilt-over aluminum tower, a tribander, miscellaneous parts and tools and a rather sorry-looking linear that turned out to be a real powerhouse. After a reasonable showing in the November 2000 CQ World Wide CW with three operators using wires and the low tribander, the bug bit hard, and we wanted more. By the following April we had marshaled an incredible pile of tower, antenna, and support parts in W8AV's barn in Ohio — some 5000 individual pieces in all, nearly all second-hand, begged and borrowed stuff — and we'd figured out how to put it on a boat and get it to the station.

The buildout that followed netted two Rohn 45 and 55 towers, more than a dozen hard line-fed Yagis and greatly expanded infrastructure inside the shack. Antenna improvements and refinements followed, including the incorporation of two superb Beverages inspired by W8UVZ, a wire beam for 80, a serious Ethernet guided by NWØL and lots more indoor equipment. As the antennas went higher, so did our scores. Our enthusiasm and energy were on the way up too, and PJ2T took on a life of its own. We had proven to ourselves that we could put on a high-profile operation on a decidedly low-profile shoestring budget, and we saw few limits to sustainability. PJ2T was here to stay, and the fun factor was unbelievable.

Problems Begin

Then, part of an antenna fell down and transceivers failed after only months on the island. Computers flaked out after turning brown inside from corrosion. Amplifiers literally exploded like clockwork. Silver towers became brown towers. Supposedly UV-safe plastic parts crumbled to dust, stainless steel got stained and some grades of aluminum literally dissolved into a wet, salty mush. While our computer mice died, the furry type thrived in the kitchen cabinets. Insects took over. The toilets clogged, the septic tank overflowed, faucets sprang leaks, the island caretaker turned out not to be able to take care, vandals visited our off-site antennas and the easy long-term sustainability of PJ2T appeared in doubt.

The first aluminum rain consisted of the reflector and about five feet of boom from the Europe 15 meter monobander. It didn't take long to discover that the galvanized U-bolt attached to an overhead boom truss coupled with a liberal coating of salt and water and stressed mechanically by the incessant tropical easterly trade winds had resulted in a classic case of dissimilar metal corrosion. The U-bolt had literally eaten into the boom, and the wind did the rest. A quick inspection of the remaining antennas revealed scores of similar problems on all three towers, and panic began to set in. This was an emergency! Failing a quick fix, the whole suite of antennas soon would fall apart.

Battling Tower Rust

The two Rohn towers were not faring much better. In our naiveté, we had trusted the original Rohn galvanizing to protect the steel. What fools! Within a matter of only

a few weeks of building the towers, metal surfaces rapidly began turning brown. The obvious first aid included sanding, followed by Rust-Oleum and/or cold galvanization. No luck. The brown reappeared within a couple of months. At that point, our local friend Fernando, PJ2FF, warned me grimly while looking sternly over his glasses, that two-component paint was our only hope, and that it might even be too late for that. He sent me to the Curacao paint factory, *Antilliaanse Verffabriek*, and I came back with gallons of machine-gray epoxy paint at $130/gallon.

In the ensuing epoxy-versus-man battle, the epoxy won. Never having worked with the stuff before, I dutifully followed the directions on the can, mixing paint with epoxy at the recommended 6:1 ratio. I sanded as well as I could and started at the top of the 100 footer, working down. The "pot life" of a batch is about 90 minutes, and by then the remaining paint was stuck to the bucket, which was stuck to the brush, which was stuck to my gloves which were, of course *really* stuck to my hands. Back on the ground we started the cleanup, only to find the epoxy completely impervious to paint thinner, the brush reduced to trash and my arms, neck and forehead destined to be gray for a very long time. It was so bad that a couple of weeks later the flight attendants the plane to Miami seriously discussed denying boarding privileges to the suspicious-looking tin man (this was just weeks after 9-11.) I finally talked my way onto the flight, but I had a lot of explaining to do when I got back to work in Ohio.

The epoxy stayed on me longer than it stayed on the tower. Next trip, the rust blooms were already poking back through. In an ensuing chat PJ2FF admitted that he had forgotten to tell me about the primer. Better living through chemistry. Starting over with even more aggressive surface preparation and epoxy primer, followed by finish coats, yielded a much better result. This seemed to keep all but the worst of the rust in check, and we embarked on what became a nine-year program of carefully coating and then *re*coating all sections of both towers every six months. When rust blooms poked through, we sanded as well as possible and kept right on coating. WB9Z and N8NR assisted in this effort, with additional assistance from 20 feet up to the bottom from some of our PJ2T non-climbers.

In March 2010, though, I found a particularly ugly-looking rust bloom on a Rohn 55 leg, hidden beneath some cable tape. Digging into that spot revealed a horrifying 5/8-inch diameter hole all the way through the wall of the leg. After cleaning that up as much as possible and power sanding and recoating, we applied a leg splint assembly that WB9Z had fabricated.

Figure 2 — Anodized aluminum boom cradles fabricated using DX Engineering parts and homebrew pieces by N8LGP for side-mounting Yagis have survived the severe climate

Figure 3 — March 2010: A horrifying hole in a Rohn 55 tower leg that we almost missed. This section was nearly new in 2000 when it was installed. The leg was 100 percent good a few inches above and below the hole.

That hole led to a change in tower maintenance philosophy. We dropped the coat-everything philosophy in favor of watching for blooms to poke through and then aggressively attacking those sites with a power sander and grinder, cleaning down to the bare metal before recoating with epoxy primer and finish coats. This is working well, and we're confident that this approach, coupled with continuing aggressive inspection of guy wire assemblies, will keep the towers in the air for another 10 years.

Yagis and Guys

But what of the "aluminum rain?" The fix was to take down the Yagis in 2006 and 2007 and rebuild everything with quality DX Engineering saddle clamps, so there was absolutely zero possibility of corrosion anywhere on any of the Yagis. All joints and parts were aggressively weatherproofed to keep salt spray from contacting metal, and that has done the trick. The Yagis have been mechanically bulletproof since the rebuild.

Taking down the Yagis, though, turned out to be an even bigger trick than we had imagined. Nearly all of our beams are fixed and side-mounted to avoid rotators and their accompanying failure points. In most cases we used Hy-Gain aluminum boom-to-mast mounts and top-quality stainless bolts to mount the antennas to the tower legs. When it came time to take them down, however, we found that the stainless bolts had totally and irretrievably welded themselves to the Hy-Gain blocks. No amount of torque, pounding or solvent could free them, so we had to cut the bolts with grinders just to get the Yagis off the towers. N8LGP and I designed and fabricated new side-mount saddles consisting entirely of anodized aluminum and stainless parts. These have now been trouble-free for four years.

Guy assemblies were not exempt from corrosion either. We had used Phillystran down to about 15 feet, transitioning to steel for the remainder of each guy run to the ground. The steel was to protect the guys from brush fires, vandals and accidental damage to the more vulnerable Phillystran. While this made sense for guy wire integrity, it was folly in terms of corrosion.

Since experiencing guy anchor and dead end rust in 2001 to 2003, we replaced every dead end and installed quarter-inch EHS cable and, in some cases, new turnbuckles. After assembling the guy tails, we paint the steel guy wire with a coat of epoxy primer and a finish coat of epoxy finish, and then wrap the entire length in Scotch 33, finishing up with a coat of varnish on the tape. Same with the dead ends. The egg insulator and turnbuckle assemblies are completely encapsulated in duct seal putty, taped with Scotch 33, which then is varnished. The proven principle is that if we can keep the salt-laden water micro-droplets from contacting metal, then all will be well.

This approach, time-consuming as it's been, has worked beautifully. Nonetheless one Phillystran guy grip scheduled for replacement in October 2010 decided to let go one month early. This was a top guy on the 80 foot Rohn 45 tower. By virtue of extreme luck, I was on site when this happened and was able to get a safety rope on the tower promptly, before the whole thing collapsed. We subsequently replaced the guy.

Now that we're in steady-state maintenance mode, we inspect, scrape, paint where necessary, periodically open a putty bundle for inspection and repeat the cycle. We have even dug up six inches or so of guy anchor rods to be sure there was no sub-surface corrosion. The PJ2T outside plant is now well protected, but maintenance takes so much time that it's impossible to contemplate putting up anything else. After all, we can barely maintain what's there now. Still, it's entirely worth all of the pain in exchange for the fantastic operating thrills.

Radios, Computers and Amps

Without antennas, we have nothing, but contest stations also need functioning boxes on the desks inside. We discovered quickly in our first two years that only Yaesu FT-1000s seemed able to survive the hu-

Figure 4 — Cutting apart totally fused stainless bolts and a Hy-Gain boom-to-mast mount. We had to do this to five similar assemblies at PJ2T in order to get them off the towers.

Figure 5 — Goose, W8AV, on 15 CW at PJ2T Station #1 during the 2010 ARRL DX CW.

Figure 6 — This joint between Phillystran and a quarter-inch EHS guy wire tail contains a large egg insulator. All parts have been painted with epoxy, totally encapsulated in duct seal putty, wrapped in Scotch 33 tape and varnished.

mid, corrosive environment and a diet of 50 Hz ac power. Since then the generosity of our members and Yaesu has enabled us to acquire lots of FT-1000s and FT-2000s. We similarly determined that Ameritron AL-1200s, with their simple circuitry, lack of microprocessors, a rugged 3CX1200A7 tube and field-repairability are our linears of choice in such a distant, hostile location. The solution for short PC life has simply been to take an awful lot of them (22) to the island, so that spare systems and boards are always available in a pinch. At $75 a pop, dated *Windows 98* machines have served us well for more than 10 years. For the coming season, though, we are switching to new Dell *Windows 7* mini-desktops; we'll report in a couple of years how this PC philosophy works out.

Even with this preferred collection of radios, amps and computers in place, reliability remains low. For years a steady stream of heavy, equipment-bearing shipping containers have passed to and from the states, going to or returning from repair. All of these go as checked baggage, and many of our members and PJ2T visitors have graciously accompanied shipping containers on the airlines and then shipped them to their stateside destinations.

The present era of high costs for large and heavy checked baggage and aggressive customs agents and TSA inspectors has greatly complicated this process. Imagine what a plate transformer for an AL-1200 packed in many layers of foam in a hard-sided suitcase looks like on a TSA imaging system. Tracking all of this is where the detail management challenge comes in. With 12 transceivers, nine linears and 22 PCs in inventory — not to mention hundreds of supporting items (rotators, rotator controllers, computer and network peripherals, spare parts, accessories) — it has become a full-time job to keep all the records and manage all of the maintenance. And this says nothing about the challenges of maintaining a piece of real estate 4200 miles away in a severe tropical climate.

The Future of PJ2T: Help Needed!

What of the future? How can we sustain PJ2T, which some people tell us has become the most-logged call sign in all of ham radio? It boils down to being willing and able to keep doing the scut work — spending hours in the hot sun and beating wind, filthy and sometimes bloodied, pursuing this labor of love. Characteristic of all volunteer organizations, we are heavily dependent upon one person who happens to have the right mix of passion, energy, opportunity, life situation, resources and the assistance of dedicated club members to keep things going. But I won't be around forever, and in another decade, I'll be 10 years older and 10 years less capable. In addition I'm now living in North Idaho instead of in Ohio, thousands of miles further away from Curacao. It's an expensive, killer trip to get to the Caribbean from the Pacific Northwest. As a result, sustaining PJ2T devolves to finding a way to replace about 50 percent of my time and work in the coming decade. I am still engaged, still passionate, and still energetic, but I cannot realistically expect to continue working at last decade's level.

At present PJ2T is funded as a low-overhead operation through small donations and modest annual membership dues. In the 2010 Dayton Hamvention® Contest Forum we discussed some outside-the-box ideas for keeping the station viable. One approach would be to find a part-time, resident station caretaker. Presumably, this would be a retired contester who loves the tropics and is willing to spend weeks or months at PJ2T as an unpaid resident maintenance person. Of course, this would be in exchange for access to a world-class station for fun operating and to a warm, sunny ocean in the front yard in lieu of cold, gray, sometimes-inhospitable North American weather. This person would need to be an accomplished climber and rigger and possess skills ranging from software to septic system maintenance.

Another option would be for a major vendor or major Amateur Radio organization to liberally sponsor the station, so that there would be enough resources to compensate someone to do extensive on-site maintenance work. A variation on this idea would be for a major club to adopt PJ2T as its overseas club station. Yet another would be to transform PJ2T from a shoestring, all-volunteer, totally non-profit entity into an aggressive profit-seeking business — a ham radio resort, but this is counter to all of the basic economic philosophies of Amateur Radio. Or maybe we can sustain the station long term by soliciting large numbers of $20 donations from the world ham radio community, which might come to be known as death by PayPal. Yet another approach would be to add a wealthy benefactor to the PJ2T organization. With sufficient resources, anything is possible.

We're still brainstorming, and these ideas may not be feasible or even realizable. What can *you* suggest? Can the contest community engage in massive "groupthink" and figure out a formula to keep this station playing into future decades?

It's worth it. The Coral Cliff neighborhood of Curacao may be — second only to ARRL Headquarters — ham radio's Mecca. Since the late 1960s, starting with Chet Brandon, PJ9EE; John Thompson, W1BIH/PJ9JT; Vic Clark, W4KFC, W4GF and other notables, followed by RadioTeam Finland and now the PJ2T club, there has probably been more RF emitted and more QSOs completed from there than from any other corner of the globe. The desk in the southwest corner of John Thompson's house, now PJ2T station #1, has probably supported more contacts than any other spot on the globe. As a global contesting community, we're all part of this ongoing radio history. Help us figure out how to keep it going. We owe it to W1BIH and the others who have followed him.

NCJ