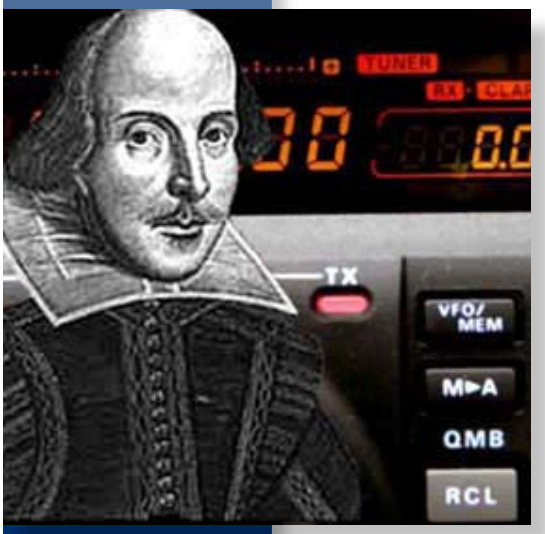
K9YA Telegraph

Robert F. Heytow Memorial Radio Club

Volume 5, Issue 8, August 2008



Brush Up Your Shakespeare

With Apologies to William Shakespeare and Cole Porter

Philip Cala-Lazar, K9PL

All the world's a stage,

And all the men and women merely players:

They have their exits and their entrances;

And one man in his time plays many parts…

William Shakespeare: ***As You Like It*****, Act 2, Scene 7**

Continuing, Shakespeare says our "acts" run "seven ages" from "the infant, Mewling and puking in the nurse's arms" to senility and death, "…second childishness and mere oblivion, Sans teeth, sans eyes, sans taste, sans everything."

"All the world's a stage…"

Emboldened by the Bard of Avon we can therefore write, "And a ham in his time plays many parts…" However, I'd differ from his Elizabethan viewpoint and based on personal experience assign at least ten ages to a ham's span in the troposphere.

The Parts

1. The *maker* of the landmark first QSO, and after adding a few more for good measure it is soon apparent that through ragchewing we make friends, both near and far; learn protocol and procedure; hone our technical skills and; for CW ops, improve speed *and* accuracy.

2. The *collector* of QSL cards. Any and all QSL cards to fill up those proverbial shoeboxes. At this point the states of Alaska and Hawaii are pointedly pursued to complete WAS.

3. The *chaser* of "DX." DX at this point qualifying as any station outside our town. Nearby cities and states are easy prey followed by, for U.S. hams, Canada, Mexico and the Caribbean. Now the world is our oyster and the seven continents and seven seas our playground as we chase real DX worldwide.

4. The *entrant* in DX contests to quench our competitive spirit and, acquisitively, to fill our QSL coffers with 100 DXCC countries.

5. The *melancholic* coming to grips with dismal contest scores. Whereupon the decision to bask in laid-back state QSO parties and similar friendly events.

6. The *experimenter* homebrewing and kit building station gear. This is a continuing role in many hams' repertoires.

7. The *explorer* of modes and amateur spectrum from HF through UHF. This, too, is a continuing role in many hams' repertoires.

8. The *hoarder* of diplomas and certificates. We studiously fulfill exacting qualifications, carefully sort and bundle QSLs, send them off with green stamps or the increasingly rare IRC, never perhaps to see them again and wait interminably for an envelope adorned with colorful and exotic postage stamps to appear in the mailbox.

9. The *minder* of one's pints & quarts through ensuing years may lead one day to finding an A-1 Operator Club certificate in the mailbox.

Continued - SHAKESPEARE on Page 8

Inside This Issue…

Brush Up Your Shakespeare	Page 1
Snow on the Radials	Page 2
K9YA Field Day	Page 4
QRP the Hard Way	Page 5
You've Got a Ticket to Ride	Page 6

Philip Cala-Lazar, K9PL
Editor

Mike Dinelli, N9BOR
Layout

Dick Sylvan, W9CBT
Staff Cartoonist

Rod Newkirk, VA3ZBB
Contributing Editor

Robert F. Heytow
Memorial Radio Club

www.k9ya.org
telegraph@k9ya.org

Snow on the Radials

The Siren Call of Low Band DX'ing

Chuck Guenther, NIØC

Top-Loaded HF-2V

During the downturn of sunspot Cycle 23, I began focusing my DX'ing efforts on the two octave span of amateur radio's RF spectrum known as the low bands: 40- and 80-meters in the HF range and 160-meters, our MF band. This has been a most enjoyable and productive experience, and I've learned a lot in the process of completing 5-band DXCC plus WAS and WAC on 160-meters running approximately one-half the legal limit to modest, backyard, vertical antennas. I continue to pursue the four 80-meter zones needed to complete *CQ* magazine's formidable 5-Band WAZ award, as well as the fifty more countries needed to complete my basic 160-meter DXCC.

When the subject of DX'ing comes up, the average ham generally thinks in terms of towers, beam antennas and sunspots as prerequisites for participation and enjoyment of this aspect of amateur radio. Some years back, *QST* did a feature article on W1GKK who had reached the top of the DXCC honor roll by operating 20-meters exclusively. Indeed, twenty meters has been the most productive DX band for me as well. Yet my attraction to low frequency DX'ing predates my ham licenses.

Until the age of nine, I lived with my parents and twin sisters in a one-bedroom apartment in South St. Louis. Housing was scarce for a young family with small children during World War II. According to the baby book my mother kept for me, my first complete sentence uttered at age 16 months was: "Turn radio on, peas." The earliest radio I recall was a Zenith table model AM broadcast set in a brown plastic case that sat on top of the kitchen refrigerator out of children's reach.

Zesch's radio repair and magic store was conveniently located just around the corner from our apartment building. Mr. Zesch, who resembled Groucho Marx, often entertained customers and pesky kids with magic tricks at the entrance to his shop. I tried in vain to get him to divulge his secrets. Searching for clues, I would root through the trashcans behind his store, picking up discarded radio parts: resistors, condensers and vacuum tubes. The juxtaposition of magic tricks and radio repair made perfect sense to me then and, I confess, it does to this day. Radio was—and still is—magic to me.

In 1954, my parents purchased an old Victorian house, and I finally had my own room. More importantly, we now lived within walking distance of the rented flat where my cousins lived with my aunt and our grandparents. My cousin Jack was a year and a half older than I was, and was a big brother to me. We shared interests in chemistry and electricity and electronics. I recall vividly the day we tried to make a diamond by applying heat and pressure to a carbon rod obtained from a dry cell. Our grandfathers' cast iron bench vise cracked in two as a result of our efforts, and there were no resulting gemstones to help pay for the damage.

Our interests moved on to radio as we built crystal sets and short wave receiver kits. Jack climbed the telephone pole in the alley behind my house and we strung up a wire antenna from my bedroom window to the pole. Jack built a Heathkit AR-3, and I purchased a used National SW-54. Shortwave listening was fascinating, and we collected QSL cards: CHU Canada, Radio Nederland, and Radio Helvetica, etc. We even sported SWL "call letters," issued by *Popular Electronics* magazine. Mine was WPEØGR.

Before we got our ham licenses, we tried radio transmitting as well. We hooked up old Ford spark coils to our wire antennas and powered them with lantern batteries we keyed using surplus J-38 keys. By this time, we had memorized a few characters of the International Morse code. As I recall, we imitated Marconi's trans-Atlantic experiments, transmitting the letter "S" at prearranged times. We listened for each other between local stations on the high end of the broadcast band. Jack never heard

Robert F. Heytow
Memorial Radio Club

www.k9ya.org
telegraph@k9ya.org

my signal from his house, which was about five blocks away, however, my friend Bud Riegert could hear me faintly a block away and my signals were Q5 on the kitchen radio downstairs, where my father was trying to listen to the ball game. Needless to say, the latter reception report marked the end of our illegal spark transmissions.

Within a year, though, the three of us (Jack, myself and Bud) were duly licensed by the FCC, operating as KNØSSN, KNØVSH and KNØYIP, respectively. Our worlds expanded as we began measuring "DX" in terms of a thousand miles or more, operating on discrete frequencies in the Novice segments of the 80-, 40- and 15-meter bands. Our Morse skills increased rapidly and we shed the "N's" from our call prefixes when we obtained our General Class licenses.

In the early 1960s, the General Class license extended all amateur privileges. That included access to 20-meters, where we began pursuing DX, moving about freely with our newly acquired VFO's. Dick Spencely, KV4AA, on the U.S. Virgin Islands used to hang out on 14,090 KHz. He was always good for a quick signal report. We chatted with Art, W2QB, in Buffalo, New York, who had been an amateur since before the Titanic. I still recall Art's slow but steady fist calling CQ. My first Asian station was JA5MU, worked on July 24, 1960. His QSL card indicates he was running 10 watts output from a 6BQ6S transmitter to a "Longwire, 60m long, 40m high, 30 deg. Slop from chemneys top."

After completing Worked all States, and Worked all Continents, we began counting countries. Was it possible with a modest station (about 50 watts output and wire antennas) to reach the 100 countries required for DXCC? I logged my countries in a copy of the third edition (1959) of Sam Fraim's, W3AXT, *DXERAMA*, a ham radio awards directory. One day, I looked closely at the reproductions of six of Sam's QSL cards on the front and back covers, and noticed that they comprised a WAC achieved on the 80-meter band! Meanwhile, Jack had made an early morning QSO with VK3XB on the 40-meter Novice band. DX was indeed possible on the low bands; however my yard wasn't big enough for a good 40-meter (let alone 80-meter) antenna.

Fortunately, we soon got new next-door neighbors on both sides of us who were sympathetic. They each let me tie the ends of a parallel dipole for 80- and 40-meters in their backyard trees. However, our new neighbor to the east was Bud Riegert, KØYIP. His mother had purchased the house next door! Now we both had a serious QRM problem, and Bud and I learned to take turns using the HF bands. Nevertheless, both of us managed to acquire our DXCC awards.

Partly to avoid clashing with Bud on 20-meters, I got involved in CW traffic handling and high-speed ragchewing on 80-meters. Sometimes, after my skeds with W9RCB and WØDCP (and completing my EE homework for St. Louis University), I would listen for DX on the low end of 80-meters. On January 30, 1963, I worked ZL4MF, followed by W6ZDF/KM6 on Midway Island. I even spent a brief period operating 160-meters with a clandestine antenna of relay wire strung along neighbors' garage roofs down the alley behind our street. Running only 50 watts input power, I worked several east coast stations and a VE3 before the trash truck finally knocked out my antenna. For many years these would be my best low band DX achievements. My interest in low band DX'ing would lie dormant for many years as family obligations and apartment living made it impractical. Indeed, I was QRT from late 1969 until late 1984.

Radials on the Pool Cover

Since the downturn of Cycle 23, a Butternut HF-2V 32 ft. vertical antenna modified with top loading rods has facilitated my 80- and 160-meter DX'ing. However, since our backyard contains a large swimming pool as well as flower and vegetable gardens, deployment of the requisite radial system for this antenna is a seasonal event. Each April, scores of 14 gauge wires of random length are carefully taken up and coiled for storage in cardboard boxes in the garage. In September, after the swimming pool is closed and covered, the radials are again stretched across the backyard in anticipation of the coming low band DX season. Year round DX'ing is accomplished on 40-meters with a Force 12 Sigma 40 vertical dipole that requires no radials. ■

Chuck Guenther, NIØC, retired recently from St. Louis Community College, where he taught engineering and electronics as a full-time professor for 24 years. Prior to that he worked as an engineer in the aerospace industry.

Robert F. Heytow
Memorial Radio Club

www.k9ya.org
telegraph@k9ya.org

K9YA Field Day

Preparation, Execution, Learning, Camaraderie and Fun

Mike Dinelli, N9BOR

John, AAØBP (L) and Steve, N9WAT (R)

It's 6:00 A.M. on Saturday morning. The car is packed and so begins my journey to Camp Lakota—65 miles northwest of downtown Chicago. In some ways, the ninety-minute drive seems a world apart. From high density city living to a slower paced, rambling, holiday weekend.

I plug my portable GPS into the cigarette lighter and nothing happens. There is no simple fix—SNAFU—not to worry; I have the travel directions printed out. Steve, N9WAT, Chuck, NIØC, and John, AAØBP, will meet me there. This year, Art, WB9JKZ, is out of town, but he already delivered the tower and sleeping tent to the site. Philip, K9PL, is also unavailable, but supplied equipment, copied the CW Bulletin and transcribed it for bonus points.

Rain and thunderstorms are forecast for the weekend, but all is clear for now. It wouldn't be Field Day without storms.

I'm the first to arrive, so I check in with Quinn Ryan, the camp's ranger. "Oh, you guys are here this weekend?" Sensing a problem, I clutched the binder containing our confirmation e-mail—ready to pounce. However, Quinn wished us a good weekend and said he would stop by sometime to see how we were doing.

It wasn't long before the rest of Team K9YA arrived. We unpacked our cars and began setting up our shack, which is in a portable screen room. John pulls out an umbrella and everyone went silent—we're doomed! I suspect he also washed his car before leaving.

Prior to Field Day, our equipment list is passed around via e-mail. Each of us is responsible for the items on our final list. We test our gear before bringing it to the site. Our comprehensive list includes backup items, operating manuals, fuses, snap ferrites, tools, sleeping bags, Tylenol® and plenty of bug spray.

We work well together and split up the tasks to get ready for the 1:00 P.M. liftoff. The station and antenna go up as anticipated. I fill our Honda generator with gas and carry it about 75 feet away. We run the power cord, set the choke and pull the rope. Nothing. After a few pulls, I smell gas and realize fuel is leaking from somewhere and it's collecting under the generator.

I pull out a dime and unscrew the side panel. There's gas flowing through a clear plastic fuel line running from the carburetor float bowl to the bottom of the generator. In my haste, I deduce the float might be stuck, but Steve realizes he forgot to shut the float bowl drain. This is a nice feature for storing the generator, as you don't want old gas varnishing the carburetor. Steve pulls a small screwdriver out of his pocket, twists the valve and this problem is solved.

While Field Day is a planned event, it offers us experience in preparation for a real emergency. We learn to bring backup equipment, because things fail. We learn to test equipment and read manuals. We learn to rely on the expertise of our colleagues. The dog can't eat our homework because people count on us.

> *"…plenty of bug spray."*

As 1:00 P.M. approaches, Chuck and I tune the bands to study propagation. We decide to start on 20-meters as there are plenty of signals. With the laptop computer and TR software keying the rig, we're calling CQ and establishing a great rate. Unfortunately, a storm arrives and we are forced to shut down for a couple of hours due to lightning. We disconnect

Continued - Field Day on Page 8

Robert F. Heytow Memorial Radio Club

www.k9ya.org
telegraph@k9ya.org

QRP the Hard Way

Scott Laughlin, N7NET

I tuned my radio to 14.060 MHZ then held my breath while listening in the headphones. Instead of copying Leo, KB7LOC, I found what sounded like a *War of the Worlds* sound stage. But what should I expect on this frequency in the middle of the night? My being here was no chance event, but rather the result of carefully laid plans that might never produce a single positive result.

In April 1999 Barb and I traveled to Arizona's Sonoran Desert and rented a comfortable spot to pause. There was something fetching that caused us to stay long enough to greet the rotation of all four seasons.

Many folks arriving at such desert locations search for a stout walking stick, a large water bottle, and perhaps a wide brimmed hat. For us radio people, however, digging in means configuring a VHF and HF radio station. While Barb, KC7BSY, doesn't share my CW enthusiasm, she enjoys two-meter radio and has more than once headed up the local traffic net when the net control failed to show.

Our adventure began in earnest after purchasing a suitable fifth-wheel trailer. It came furnished with pots and pans, dishes, silverware and towels. Located more than a mile from the nearest power grid meant that we would have to configure a solar system.

> *"…let's give it a shot."*

Our funds were limited, so the final choice consisted of a single 75-watt solar panel and two 6-volt, deep-cycle batteries wired in series so as to provide a 12-volt power source. Only then was it time to consider a radio.

My old Swan that served me during the '91 Gulf War was a power hog. The new radio would have to be solid-state. After a week of pondering I decided to keep my Army MARS tuner and purchased an MFJ-9420 transceiver with a CW board. A G5RV wire antenna from AES in Las Vegas completed the system.

MFJ reviews claim there is no hotter receiver. The speech processor is no slouch either. During the hours of midday sun the output to the coax measured just shy of nine-watts. It was enough signal to fetch sideband QSLs from across North America, including Hawaii and Alaska. After sunset the power output reduced to a needles-width above five, close enough to qualify for QRP. Then, as though he'd held his ear to ground, Barb copied a message off the National Traffic System. "It's from Leo, KB7LOC. He wants to do some QRP," she said.

Not a problem, I thought. His QTH, midway up the Oregon coast, some seventeen hundred miles to the northwest would be a walk in the park.

I was not aware that Leo was losing his eyesight. Nor did I realize that nailing down the cause had cost him his radio shack, the one that had served as the Oregon Army MARS Gateway Station.

"So, how are we going to do QRP?" I asked him over the phone.

That's when I learned he and I both attended radar school at Kessler AFB in 1957. He explained that he'd played lead guitar in the Down Beat Club in Biloxi, Mississippi. Somehow our paths had never crossed until we met in Oregon 27 years later. His failing eyes had not prevented him from earning side money tutoring classic guitar. Soon he had acquired a used HW-8. Tweedy, his YL, helped him dial in the frequency and tune the antenna. In short order he is good to go, except for his commitment to guitar students. Wednesday evening is his only free time. He stops short upon learning the only rig I owned was a 20-meter monobander.

"Well, let's give it a shot. I'll call you every Wednesday starting at seven, my time. I'll continue calling for one minute, beginning every quarter hour on 14.060 plus or minus QRM. If we haven't connected by eight I'll secure my station until the following week. Eventually we'll make it."

CONTINUED - QRP ON PAGE 8

Robert F. Heytow Memorial Radio Club

www.k9ya.org
telegraph@k9ya.org

Volume 5, Issue 8

You've Got a Ticket to Ride

But Watch the Expiry Date

Rod Newkirk, VA3ZBB/W9BRD

My W9BRD license arrived from the Federal Communications Commission on a red-letter day years ago. It was good for three years and then had to be renewed. At the time I wondered how anyone could let such a precious possession expire for any reason. But I was only fourteen and hadn't yet really discovered girls. With all their frills and wily ways they could certainly do the trick, especially with no reminders. Who could mark a calendar three years in advance? But I didn't have to avoid the opposite sex; they avoided me. My ham license was safe.

Sometime later, working as operator/technician for Illinois State Police, I witnessed license expiration at its most horrific. Colleague Roy, W9PDH, had been extra busy building a house and let his tickets expire. One of our newer operators was idly perusing our posted tickets which were prominently displayed for all to see, when he hollered "Hey, Roy—your licenses have expired." We ran over, looked, and sure enough, Roy's 1st Telephone and 2nd Telegraph had gone past their five-year term plus any grace period. This wasn't a hobby. It was his bread and butter.

"Hey, Roy—your licenses have expired."

Test and Retest

Accommodation with FCC might have been possible but the cat was too far out of the bag. It quickly became known throughout the system that one of the Chicago operators had let his licenses lapse. There was some dispute that Roy's supervisor, Ero, W9HPJ, was at fault. No matter. He was technically unqualified and all his paperwork required countersigning until he retook and passed the required elements all over again. Which he accomplished in thirty days, no easy feat at his age.

Some degree of poetic justice transpired when Roy's boss let this W9HPJ amateur license expire soon afterward. Ero, first licensed in the 1920s, was proud of his ham ticket. Roy nearly laughed his head off. Ero settled for downgrading to a Novice license and new callsign KA9DYS. He managed to find similar souls in the Novice bands who could handle his 35-wpm bug fist. This was enough ham radio for ex-W9HPJ.

Extra Class

Digressing from the subject of catastrophic expiration, I sat for my final FCC exam in 1967. The Extra Class had been devised a few years earlier. It conferred no new operating privileges so I didn't take it seriously until word got around that only Extras would be allowed t o use the lower 25 kHz of my favorite DX bands. That made me hit the License Manual overtime. It was one tough exam, worse than commercial elements. Until watered down considerably, it was assumed that you had a hands-on knowledge of early amateur radio. I know I blew one simple question: What should be done when one's headphones become insensitive? Reverse connections, of course.

Betty?

Moving to Canada resulted in what should be my last examination. As a licensed U.S. ham I asked for and was granted the callsign VA3ZBB to match the XYL's VE3ZBB. No problem. But the telephone rang that afternoon to inform me that my new call couldn't be used until I passed Canada's exam. Ironically I could have signed W9BRD/VE3 indefinitely. But I wanted to do things right and made an appointment with examiner VE3WDP, a no-nonsense guy. I scraped through okay after cramming with Betty's neat notebooks from her 1988 exam course. By the way, getting a callsign with her suffix wasn't such a bright idea. People on 40 CW still answer me with "Hi, Betty." Frills and wily ways—she now helps to keep me from expiring before my license does. ■

Robert F. Heytow
Memorial Radio Club

www.k9ya.org
telegraph@k9ya.org

Icebreaker Mackinaw, W8AGB

K9YA Telegraph

Chuck Scott, N8DNX

The Charlevoix, Cheboygan, Emmet Counties Public Service Communications Organization (CCECPSCO), a northern Michigan amateur radio emergency communications organization, received permission from the Icebreaker Mackinaw Maritime Museum to establish a ham station, W8AGB, onboard the *Mackinaw*. The *Mackinaw's* call commemorates the ship's WAGB-83 designation. In addition to HF operations, two repeaters will provide VHF and UHF handheld coverage in the Straits of Mackinaw.

Launched in 1944, the 290-foot *Mackinaw*, the worlds most powerful icebreaker for more than 30 years, joins the liner *Queen Mary* and battleship *USS New Jersey* in a short list of museum ships with active amateur radio stations onboard. Recently retired, she now rests in Mackinaw City in sight of the waterway she worked to keep open to vital shipping traffic. Members of CCECPSCO are helping restore and maintain the ship's communications systems including two Coast Guard Sunair RT-9000 HF radios with matching vertical antennas and auto-tuners. Additional radios and antennas are being added to provide a full range of ham communications capabilities.

Licensed amateur radio operators are invited to visit the Icebreaker Mackinaw Maritime Museum and operate the ship's radio station when staffed by a CCECPSCO member.

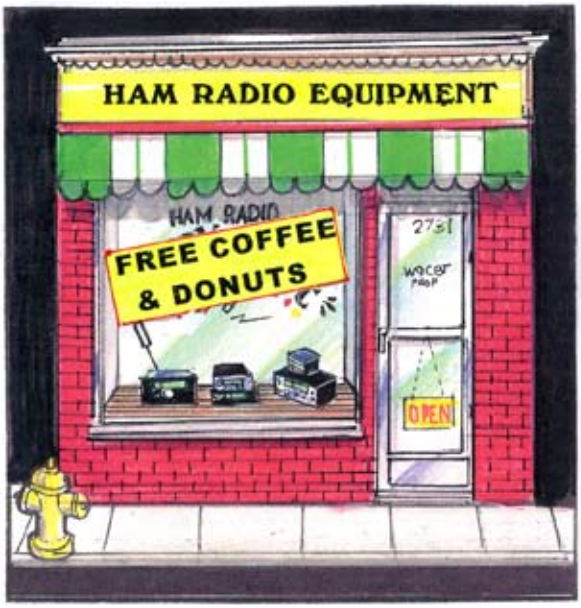
For more information:

www.ccecpsco.org

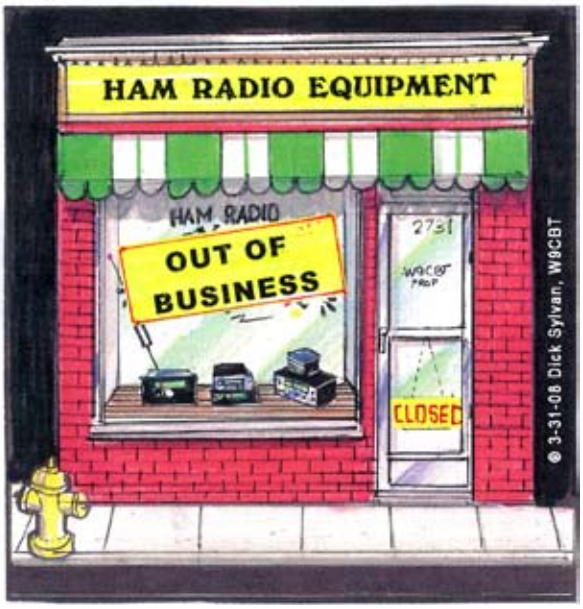
http://www.icebreakermackinawmuseum.org/

Ham Quips

DICK SYLVAN, W9CBT



GRAND OPENING



ONE WEEK LATER

Robert F. Heytow Memorial Radio Club

www.k9ya.org

telegraph@k9ya.org

Volume 5, Issue 8

Continued - Field Day from Page 4

the coax from our station and throw it toward the tower. This is a good time to rest and enjoy ham radio camaraderie.

When the lightning stops and we restart operation, we decide to forgo setting up the sleeping tent. It's getting dark, the ground is wet and we figure we can nap in our cars. A couple of years ago, I woke up in my sleeping bag, finding it sunk in a couple inches of water.

Even though HF propagation has been horrible, the volume of Field Day RF more than makes up for the low flux numbers. There are CW signals every few hertz and it's difficult to find a clear spot to call CQ. While one of us operates, a backup op second chairs to assist. It rains hard through the night with heavy winds. We have plastic tarps shielding us from the worst of it. A daddy longlegs likes the warmth of our laptop and keeps us company ambling about the keyboard.

Dawn on 80-meters, Chuck is calling CQ and gets an answer from KH7B. I was half asleep in the second chair thinking I was dreaming. I never worked HI on 80-meters before and here it is with a big signal.

By the end of the test, we've worked all 50-states and most sections. Our final tally is 1,130 QSOs, which is 105 short of last year's effort—K9YA's personal best. Not bad considering we lost two hours early in the event due to lightning.

Many Field Day goals were met. We introduced ham radio to scouts and public officials. We worked as a team to construct a portable station and exchanged simulated emergency traffic. However, it wouldn't be Field Day without the fun. For the next few weeks, we'll have plenty of stories to tell about our latest Field Day, while planning for our next one. ■

Continued - SHAKESPEARE from Page 1

10. The *wise* at the realization that ragchewing is the most fulfilling pursuit—for now.

Your experience will of course differ. Each of us will migrate through various stages as experience and propensity draw us. And, as our ham DNA is not set in stone, there is nothing to keep us from regressing or advancing an age or two as our interests wax and wane.

The important thing is that before we end up "Sans teeth, sans eyes, sans taste, sans everything," that we are never sans amateur radio, nor our aspirations and enthusiasm for lifelong learning and involvement. ■

Continued - QRP from Page 5

We began.

It was QRP the hard way, his one-watt and my five seeking each other in the night. After several Wednesdays the escapade took on a flavor of hopelessness.

Then one night I heard his suffix, LOC. The sound came from nowhere. His frequency was too high and sounded more like an Irish penny whistle. Catching my breath, I listened with all the strength I could muster. Then I heard, KB7LOC, and issued him a signal report of 224. He sent me a 335. Then he was gone, vanishing into the night like a wisp of smoke.

Highlights of our second contact have escaped me. His QSL is the only proof that it occurred.

Our third time comes when the band was filled wall-to-wall with atmospheric noises. I'm reminded of a scene in the movie *Apocalypse Now*. Leo reports my signal as a perfect 599. But his is heterodyning with another. The echoes and ringing are reminiscent of a carrier fresh in from the polar region. I send him a 221.

Three contacts are our total for the winter of 2000. We should have tried harder for another series of QSOs. If we'd known what the future held we would have made another run for it in 2006.

In September 2007 Leo became a Silent Key and all chances of another marathon vanished.

His will left the HW-8 to me. It needs work. When I'm finished repairing it I'll be casting about for someone with good ears who is interested in doing QRP the hard way.

Epilogue

On 5 April 2008 Leo's YL, Tweedy, went aboard a United States Coast Guard Cutter at Newport, Oregon and spread Leo's ashes on the Pacific Ocean. ■

Robert F. Heytow
Memorial Radio Club

www.k9ya.org
telegraph@k9ya.org