NCJ

NATIONAL CONTEST JOURNAL

$4

July/August 2004

Volume 32 Number 4

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- CQ Worldwide in The Gambia
- Compact 4-Squares
- How to Build a Rover
- February 2004 CW and Phone Sprint Results
- February 2004 NAQP RTTY Results

Top Photo: Preparing for CQ Worldwide in The Gambia.

Bottom Left Photo: **John**, **K6AM**, of the C5Z team works 75 meters.

Bottom Right Photo: **Bill Fisher**, **W4AN**, SK

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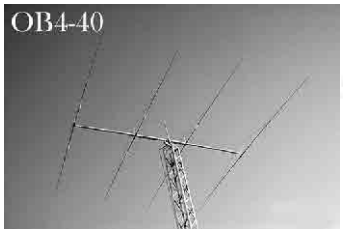

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Editorial

Carl Luetzelschwab, K9LA

W4AN, SK

Right on the heels of the news of K4OJ becoming a Silent Key came the news that we lost another great contester—Bill, W4AN. As with K4OJ, I did not know Bill personally. But I sure can cite many things that he influenced in contesting.

CQ Contest Hall of Fame

In case you missed the announcement, former *NCJ* Editor Trey, N5KO, was inducted into the CQ Contest Hall of Fame at the Dayton Contest Dinner. Steve, N8BJQ, of CQ Worldwide contest fame, was also inducted into the Hall of Fame. Congratulations, guys!

SO2R

We have two SO2R articles in this issue. Hal, N4GG, continues with Part 2 of his three-part series discussing audio switching. Additionally, in WA9ALS's RTTY Contesting column, Don, AA5AU, talks about his efforts to set up an SO2R RTTY station. Although Don is known for his RTTY contesting efforts, the problems he had and the decisions he made are equally applicable to the other modes.

Baltic Contest Results

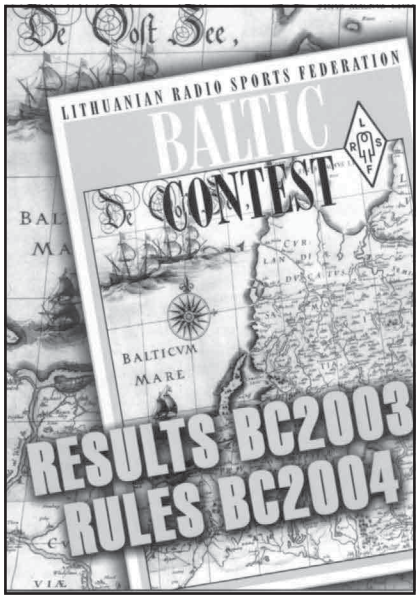
I received a little booklet in the mail from the Lithuanian Radio Sport Federation (see the accompanying photo). Eleven of the 12 pages are devoted to the results of the 2003 Baltic Contest and the other page has the rules for 2004 event. The main purpose in mentioning this is not to promote activity in the contest (it's a tough contest for those of us in North America—it's in May, it's only 5 hours, and it's only on 75 and 80 meters). The main purpose is the fact that a little 6 × 8-inch booklet is put together with the results and mailed to participants. I think this adds a nice touch to the contest. Perhaps this would be a way to increase participation in some of the smaller contests—like the State QSO parties. Something to think about.

K3NA's Antenna Interactions Series

In my editorial in the May/June issue, I said that Part 6 of Eric's series would be in this issue. There's been a change in plans—it will be in the September/October issue.

ZA Donations

With 39 news amateurs licensed in ZA as a result of Project Goodwill Albania 2003 and most of them being university-level students, it's tough for them to acquire a rig and get on the air. If you have a functional rig lying around gathering dust, please consider donating it to this cause. For more information, check out **www.za1a.com** or contact me at **k9la@arrl.net**. NCJ



Baltic Contest Results booklet.

Cloned Team Vertical Goes to West Africa

Henryk Kotowski, SMØJHF / C56JHF

Going on a contest DXpedition always involves confrontations with the elements, Mr. Murphy, local authorities and unreliable transportation—just to mention a few of the unexpected happenings. A successful DXpedition, at the planning stage, must devote more time to the unknown and unexpected rather than the obvious and known.

I personally have not participated in any DXpeditions, but I've been able to watch a few multi-operator efforts at proximity. I was once asked to go on a DXpedition to Cuba in 1997, but when I saw that the majority of the participants would be a burden instead of an asset, I refused to join them. My intuition was correct, I learned later.

The episode I wish to describe here took place in the West African country of Gambia in late October 2003 (*for CQ WW PH—Ed*). The group consisted of nine operators, the majority of them from California in the USA. The team's liaison was Phil, N6ZZ. He is no longer a Californian, but remains a member of the Southern California Contest Club. Phil has the peculiar goal of participating in CQ WW contests from all 40 CQ zones. He needed zone 35 and contacted me in the summer of 2003 and wanted to know my experience with The Gambia and Cape Verde. I offered him my assistance with The Gambia and suggested the call sign C5Z. The person responsible for Amateur Radio licenses in The Gambia is open-minded and cooperative and I was able to send Phil the C5Z license in September 2003.

The owners of a lifeless broadcast station in Banjul, the capital city, agreed to rent their premises to the team. Air transportation was a pain in the neck, but I can only write about things I witnessed myself. On October 15, Phil called me on 10 MHz as N6ZZ/3 operating from the QTH of Fred, K3ZO. "We're coming soon" was the message. Two days later the first part of the group actually arrived in Banjul. They immediately became disappointed with the coast protection operation. The Force12 verticals worked great for Team Vertical on the shores of Jamaica, but here the waterfront had been relocated 100 meters away from the house just a fortnight earlier. These verticals must be placed very close to the sea in order to perform better than average.

I wasn't the only person with experience of The Gambia that Phil had asked for advice. Juha, OH9MM, who had been here a year earlier, told Phil about coax cables his team left somewhere. Dick, N6AA, immediately decided to organize a search party—we drove to the hotel that Juha had stayed in. "Yes, we remember some Finnish guys with radios, but they did not leave any cables here" was the answer from the hotel owner. There are cyber cafes in Banjul and Phil got the name and phone number from Juha in Finland of the local coax cable caretaker. Another search party and we came back with the goods. The cables were buried in the mud in the caretaker's backyard so I considered him to be more an undertaker than caretaker. Now the cables are stowed under the roof of Radio Syd for any future needy visitors to The Gambia.

The first antennas could be placed temporarily a few feet from the water. This was temporary, as the coast protection project was not completed. The crew spreading and leveling the sand estimated these works were to be finished by Friday noon. In the meantime, Marty, N6VI, and John, K6AM, joined the group taking the same Baltimore flight a week later. They also brought some more cable and their radios. Jorma, OH2KI, came from Finland through Brussels without a radio, but brought a brand-new ACOM 1000 amplifier instead.

The majority of team members have known each other for years and all of them have been on all kinds of DXpeditions. I estimated their combined accumulated involvement in Amateur Radio in excess of 250 years. Unfortunately, none of them were willing to confess for me so I virtually know nothing about their background and experience. Either I am not a trusted person, or these guys are non-brag people.

When all the hardware and software passed the operational test and everybody looked forward to a relaxed countdown of the hours, the Evil attacked Radio Syd. All antennas were swept down by a tropical storm just two shakes of a lamb's tail before the zero hour. Earlier in the afternoon a power line surge burned everything that was connected to the mains—transceiver power supplies, amplifiers, computer battery chargers, bulbs, and fans. Anyone sensible enough would have given up, or at least postponed the activity. But sensible people don't win contests.

According to the preliminary results, the C5Z team won their Multi-Multi category. This was in spite of so many disadvantages compared to permanent well equipped and high-powered stations elsewhere. The antennas were extremely simple, most of the contacts during the

Figure 1—Assembling the 40 meter vertical. From left in the foreground: John, AB6BH, Art, W6XD, (kneeling) and Dick, N6AA.

Figure 2—The 160 meter antenna being rigged. From left: John, AB6BH, Terry, K6JL, Art, W6XD, (the official photographer of the DXpedition) and Marty, N6VI.

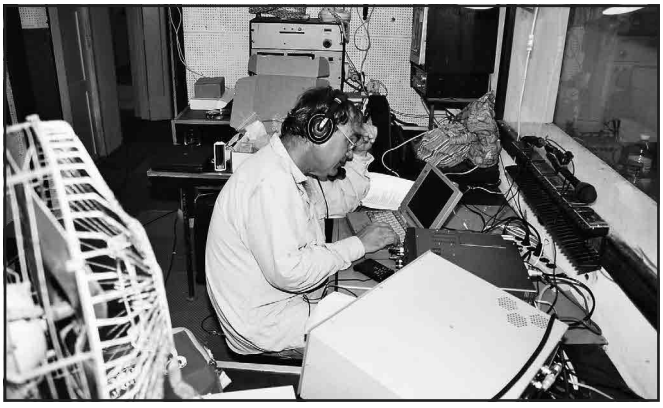


Figure 3—John, K6AM, on 75 meters in Studio A.

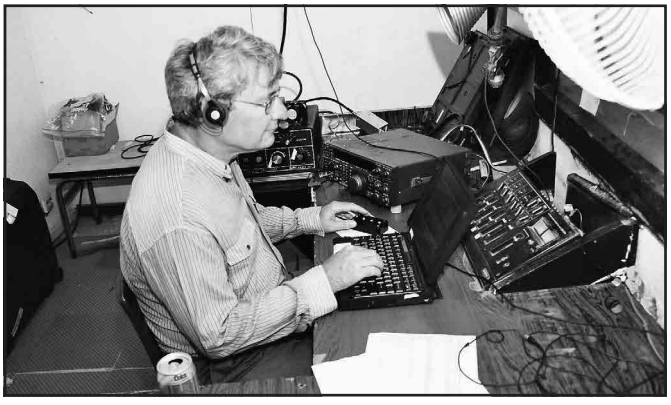


Figure 4—John, AB6BH, on 15 meters.

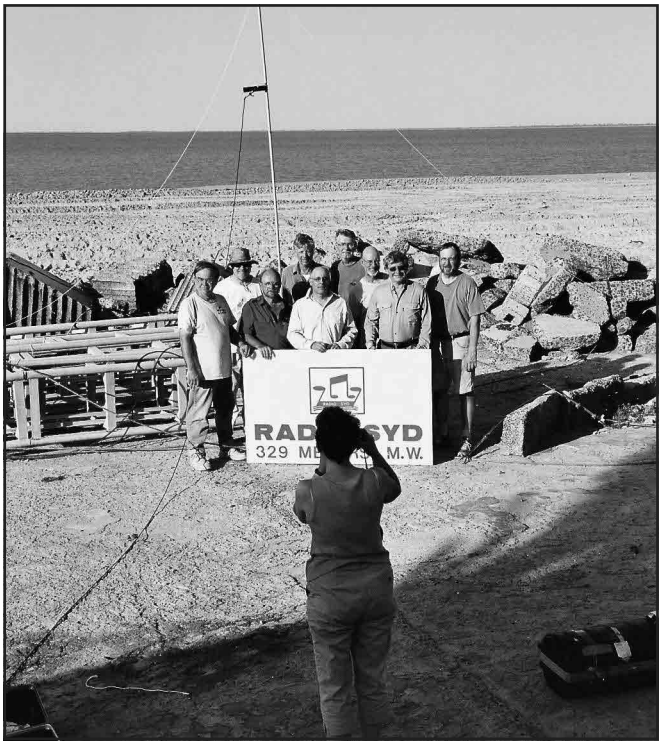


Figure 5—The team being photographed by Mary Ellen, wife of Art, W6XD. The team, from left: John, K6AM, Marty, N6VI, Terry, K6JL, Dick, N6AA, Jorma, OH2KI, Art, W6XD, Phil, N6ZZ, John, AB6BH, and Larry, K5OT. photographs by Henryk Kotowski SMØJHF copyright Permission granted for National Contest Journal to reproduce these photographs in print and electronic media, 12 February 2004

contest were conducted using low power (100 W) and numerous disasters havocked the ambiance of an enjoyable operation. The advantages of being in a place close to the ocean, relatively close to the Equator and consequently enjoying good propagation even at times of solar disturbances, being the only station on the air from this country in the contest, weighed more than the disadvantages. On the other hand, I hope, nobody is ignorant enough to directly compare contest scores of a station in Saskatchewan with another one in Aruba. The process of selecting a location and executing the operation plays a more important role than the amount of money, hardware and publicity involved.

Jorma told me about a very costly failure in the West Indies some ten years ago involving a large crowd without proper guidance. The approach of the C5Z team is commendable: low profile, low cost, high skills, and high score.

I predict increased use of relatively simple antennas and low power on contest DXpeditions — it works! And I recommend joining experienced groups, at home or trekking, to learn faster.

My own definition of a *professional* is someone who made his mistakes and learned from them. An *amateur* is someone making his first mistakes, or who did not learn from the previous ones. Some people can be *professional* amateurs — those who do something for pleasure only, but do it well. NCJ

How I Built a Rover

Chris Hoffman, K1KC

This is how I built a mobile "rover" station for the 2004 January VHF Sweepstakes. Obviously, it began with a desire. Mine came from the terrific fun I had casually operating in the January 2003 contest. I had operated in VHF contests from home before, but this would be my first serious rover effort. Once the desire was noticed, the next thing to do was to have a look at the rules. The rules would give me an idea what I could and could not do.

Types of Rover Stations

As for the rover category, there are no sub-categories. However, there are generally two types of rovers: *run-n-gun* and *shoot-n-scoot*. They may be known by different names in different locales, but the idea is the same. A run-n-gun mostly keeps moving, although there is no rule to prevent him from stopping to make contacts. They accumulate points mainly by exposing themselves to stations they would not have been able to contact had they remained in only a few grids. The run-n-gun generally uses antennas that do not have to be continually set up and taken down.

On the other hand, the shoot-n-scoot typically does setup, then partially disassembles his antennas before moving. This is because the antennas most likely cannot be used while in motion due to their size and the inability to rotate them while moving. They generally accumulate points by using higher gain directional antennas, finding high ground and perhaps by using masts or towers, and possibly higher gain amplification. After a preset time, or after mining most of the contacts from a given grid, the shoot-n-scoot rover moves to the next grid.

My choice for this contest was the run-n-gun style. With that settled, the next decision became the number of operators—one or two? Since I found it distracting to make contacts, log them and drive all at the same time, I chose safety. It would be a two person effort. The non-driving person would be the principal operator. WA4UJY was chosen as the second op. Now I had someone to consult with and to garner suggestions from.

Rover Station Design

Now comes the concept/design phase. This is not always as straightforward as it would seem. Be prepared to make many changes along the way. There are so many factors to be considered, and many of them do not surface until the project is well underway. Since it was already established as a two-op effort, we had to decide on which bands would be activated, with what modes. That would dictate the type of antennas that we would need. We used horizontal loops and turnstile antennas for SSB and CW. The verticals were already in place for any possible FM contacts.

The decision was made to construct a hitch-mounted device to support the majority of the antennas. This would allow a tilt-over design, giving us access to the antennas if necessary. It would also allow us to lower our 12-plus-foot structure in the event of low-flying aircraft! Safety and stability were paramount, so it was braced off the roof rack of my SUV in four places. I also made quick-disconnect devices to allow the lowering to be fairly rapid, and included a method of carrying the structure in the lowered mode for short distances (like from one end of the gas pump island to the other end). Our band choices were 6 meters, 2 meters, 1.25 meters, 70 cm and 23 cm. X-band and 33 cm were briefly considered, but not included in the final product. We'll save them for another day!

So now I had to figure out we were going to get everything (ourselves and our equipment) into the truck. I had already removed the third row of seats in

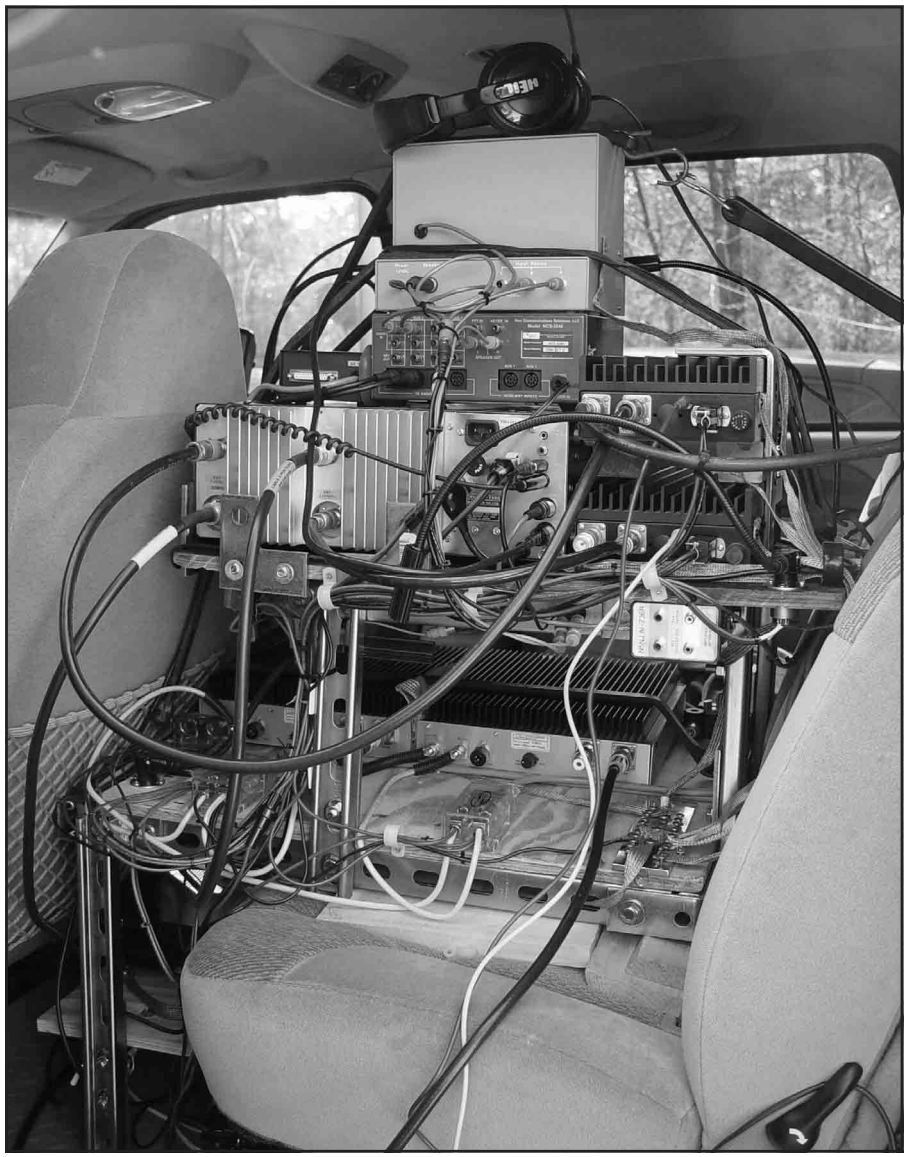


Figure 1—Technician's area.

Figure 2—Sixteen antennas!

Figure 3—Navigator's position.

order to mount a marine battery and one of my transceivers. The rest were under the second row of seats. My idea was to remove the front passenger seat and construct a workstation there. The second op would sit in the back seat on the passenger side. It soon became obvious that the workstation would have to be bigger, *lots* bigger! I stretched it out as much as I could and built different layers into it. Some equipment was run remotely.

Needless to say, the entire construction was a work in progress until contest day. We would take off in one direction, only to learn that the equipment would not do this, or the software would not do that, or whatever. We had to be flexible. What if a piece of equipment fails in mid-contest? You learn to be flexible whether you want to or not! We tried to plan for as many eventualities as we could, but who knows what might happen? Bring your tools, your test equipment and backup radios and hope for the best. I kept a paper and pen handy at all times because ideas would pop up and I might forget them later.

Acquisition Phase

Next came what I term the acquisition phase! Beside the basic construction materials, I needed a 1296 MHz horizontal omnidirectional antenna, a second GPS, audio control equipment and so forth. No, every rover does not have to have all of this stuff and a good argument could be made for leaving it behind. My concept was to automate several functions, leaving the operator to talk and log call signs and grid squares. Well, I did a lot of acquiring, but I fell far short of the automation I'd hoped for. What it did accomplish was to put together a competent five-band rover. You could say that some phases of putting together this rover never ended, like the concept/design phase and the acquisition phase. That just makes it fun!

Let me tell you about the computers. Ah, the computers. I'm not a computer person, but I had this idea that we would use three computers and they would continually show our position (aided by GPS), run logging programs and perform some other tasks. My expectation was that the logging programs would read band and mode data from the radios, the grid square from the GPS, time from the GPS or internal clock, store CW and voice memories and shine my shoes. Heck! They do everything else, why not these functions, minus the shoes? It was not to be. I could not find the software that read the grid from the GPS and read the band/mode data from the radio. Additionally, only two of the four main radios would actually *send* band/mode data to a computer. One that didn't was the only radio that operated on 222 and 1296 MHz. This set me back. I vacillated between letting the computers track the grid square or read the band/mode data from the radio that *did* report. I settled on the grid square.

Gathering the Pieces

Now, how do I put all this together and make it work? Well, I did lots of looking, thinking, scratching my bald spot and physically putting stuff here and there to see how it would fit. The ergonomics of a 30 plus hour trip had to figure into it as well. Things had to be easy to reach, see and operate. I put in nightlights for the keyboards, for the equipment faces, and for the rear of the radios, too. A fair amount of the operating would be done at night.

Not all of the work is done outside on the rover itself. One job that could be done inside was route planning. Good for those inclement days! Contacting as many grid squares as possible generally means taking a North/South route. This is because, theoretically, you can cover the "squares" twice as fast as an East/West route. Elevation counts for something, too, especially in a VHF/UHF rover! Population density is also a factor.

Population density to me means the availability of many hams with VHF/UHF capability. So we would want to be near population centers. Put all these together in a brown paper bag, shake it up and you have a route! But what if the weather is poor where your magic route says to go? Then you have a backup route. I made up four routes, all with their special usefulness. I put those in the driver's computer in a mapping program. It shows my grid square as well as the map, so that when I call CQ, I can announce my grid square. This is very important because I can work a station again from a new grid. If you hear me in a grid you have not worked me in, contact me again for some extra points!

Like most folks, I pride myself on being able to put together a plan from scratch and make it work, but I did get ideas from other contesters and manufacturers. To that end I'd like to recognize ND2X, W6OAL, K4SWJ and KB6KQ for their contributions. Thanks guys! And thanks to WA4UJY for all the computer work.

Adequate and safe power delivery was a major factor in building the rover. Basically, there is the 12 V dc system and the 120 V ac system. A secondary deep cycle battery was kept afloat by the 130 A alternator. I figure it was good for handling power surges from the amplifiers. Some

of them were capable of drawing 50 to 60 A. This was not a place to get sloppy and have a rat's nest of wires and cables. I took it seriously, used heavy gauge wire, carefully routed the wires and used tight, protected connections. Remember to fuse everything and to fuse it near the battery. Fuse both the positive and negative leads. Keep those fires to a minimum! I included a 1.0 kW modified square wave inverter and a 150 W true sine wave inverter, a smaller inverter and a medium-sized fire extinguisher!

The Final Phases

Next comes what I would call the connection phase. This phase can be very tricky and can really get you to scratching *your* bald spot. It did me! The more equipment you run and the more sophisticated your setup, the more difficult the connection phase. It presented it's own sets of problems which kept me turning in many directions. Did we want one radio in one ear and one radio in another? Or maybe two radios in two ears? Did we want to control the volume from the radios themselves or from the audio control center? Did we want one footswitch for each radio, or each footswitch to control all radios? The possibilities are endless. Quite often I recalled what my friend ND2X said, "*KISS*" (keep it simple stupid!).

Closer to the end came the antenna phase. This was when I put the antennas on for the last time before the contest and wired them up. Plus, I had to build mounts for my 23 cm FM and SSB antennas. Oh yeah, there were the external GPS antennas too! Every time I turned around there was a new task staring me in the face, but I loved it! I really felt a sense of accomplishment, and the contest hadn't even started yet! What more could I ask for?

Not to be forgotten is the testing phase. Here I made adjustments to antennas, transmit audio levels, transmitter drive levels, checked coax and connectors, looked for feedback and hum and noise, checked power connections, tested switches and radios for proper function and more. Better to get this done now than while on the road.

After that it was time to throw all that stuff in the truck that we probably wouldn't need, but would hate to leave at home if we did! Time, too, for checking the condition of our conveyance—oil, tire pressure, fluid levels and all that good stuff, clean the glass, adjust the seats and so forth. I brought along all the manuals to the equipment we were using and extra audio and coax cables, fuses, test equipment, cameras and a spare 6 meter halo. It was the only antenna I could not stack. Why? Because the minimum separation between 6 meter halos was 9 feet!

Figure 4—Main operator's position at night.

Having read all this you'd know I was pulling your leg to suggest I did this on $2 and some parts from my junk box. I opted in advance to put some resources into this project, and time was the biggest resource. But I was proud of it and am glad I did it. Now you know how I built a rover! NCJ

The 100 W Contest Final—Revisited

Mike Dormann, W7DRA

Do you like the Low Power category in contests? Do you like rolling your own amps—especially tube-type amps? If so, W7DRA offers some advice for your designs. But watch it — some advice here is tongue-in-cheek, so pay attention!

The article *100-Watt Contest Final* in the November 1956 issue of *CQ Magazine*[1] showed how to design amplifiers that ran 100 W input. Nowadays most American contests (CQ WPX, CQ WW, ARRL DX, etc) have gone to 100 W output for their Low Power class. Thus a bit of redesign from the original article is required.

Contest amplifier specifications have not changed much over the years, other than now a full 100 W output is needed (regardless of shorted coax, fallen towers, etc). The final also must be capable of being driven by normal station equipment—a Johnson Viking II, Heathkit DX-100, Collins 32V2, etc.

Design Characteristics

Danny, K7SS, along with the Pacific Northwest Contest Community, thinks concern for perfect neutralization is unnecessary, with which I agree. Neutralization should be accomplished using the simplest high voltage components possible. Grid neutralizing (*1953 ARRL Handbook*, page 143) allows the use of a single-ended output coil, easily wound on a plastic wire bobbin or on a piece of 3 inch diameter PVC pipe.

Selection of tubes for the final is not an issue; the availability of tube sockets is. Many tubes are found in swap meets, garage sales, and the like, where actual tube sockets are much harder to find, and thus making sockets the deciding factor. A $^3/_8$ inch thick Plexiglas sheet, a 100 W soldering iron and a hank of #10 wire can alleviate some of the need for sockets. In Figure 1, Plexiglas is used instead of a socket for the station's main 40 meter 100 W contest final. Note: the fan is used to keep the Plexiglas from melting.

One medium power tube (810, 805, 806, 100TH, etc) is better than 15 or so parallel 1625s or smaller tubes, since this minimizes the amplifier parts count.

One example of a 100 W contest amplifier built by Paul, K7CW, is shown in Figure 2. The liquid nitrogen pump and cooling tubes have been removed from the amplifier to better show the placement of the 100 W tube and associated tuning apparatus.

Barry, ZL1DD, a noted Down Under low power contester, feels meters are unnecessary, and only take up panel space. A portable output power meter is all that is required to check actual power to the antenna feed line. Even exciter meters are frowned upon, since monitoring the color of the screen grids of the driver is all that is needed to check exciter resonance. A low valued (100 Ω) screen resister makes screen color a good resonance indicator.

Figure 1—W7DRA's 40 meter, 100 W amp.

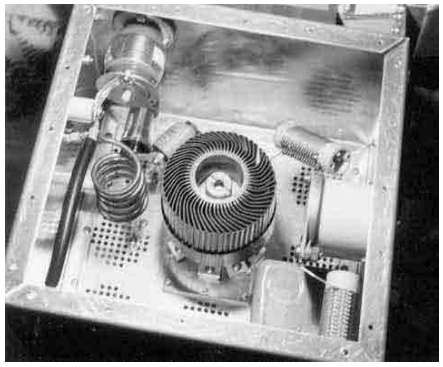


Figure 2—K7CW's 100 W amp.

Figure 3—W7DRA's 80 meter, 100 W amp.

Figure 4—W7DRA's 100 W portable amp.

Figure 3 shows the main station final for 80 meters. Please ignore the meters shown, as they were only used during initial amplifier checkout.

The 100 W contest final can take on many shapes, and another one constructed for portable use by the author is shown in Figure 4. This one also utilizes an 810, and was used during the 2003 CQ WPX contest at W7DRA/7.

With the advent of old microwave ovens available at thrift shops, the power transformer problem is solved! In the original CQ article, Freddy, HB9MS, suggests using a "bridge rectifier" (*1950 ARRL Handbook*, page 226). This is the perfect circuit for a microwave transformer, as it requires no center tap. I and with Ken Gordon, W7EKB, of the University of Idaho's College of Science, concur with using four 866s as Freddy's use of the 872A tubes in the bridge is a bit over-kill. A 25 amp 120 volt Variac is also needed to set the exact value of the high voltage required for the 100 W contest final.

There are a few major contests (such as the Minnesota QSO party) that require a 150 W contest final. If one cannot find a single tube of sufficient ruggedness, two may be used in a circuit that is described in the popular, well-referenced *1941 ARRL Handbook* (page 232), which uses a "push-push" circuit requiring no neutralization. Now with a mere pair of 8877s or 4- 250s, one can construct a 150 W contest final that can be driven by the 100 W contest final to good success (yes—K7CW did this under some rather unusual circumstances).

The author hopes that this article brings some information and understanding to the low power contesting community.

Notes

[1]Rich, W2VU, CQ Editor, advises that the byline for this article was "Ol' Smoke". It's not clear who the real author was, but we do know that Wayne, W2NSD, took the pictures and the equipment belonged to Sam, W1FZJ.

Compact Four-Squares

Al Christman, K3LC
Grove City College, 100 Campus Dr
Grove City, PA 16127-2104

Introduction

The four-square phased vertical array is very popular for use as a low-band contest or DX antenna. Unfortunately, it requires a lot of space to install the four vertical elements and the associated ground system. This article describes several designs for compact four-squares, suitable for operation on the 80 meter DX phone band, which will fit within an area of real estate measuring less than 50 feet by 50 feet.

Background

None of these arrays have actually been constructed, but all were simulated on the computer, using *EZNEC4*[1]. The operating frequency is 3.79 MHz, and the soil is assumed to have an electrical conductivity of 0.005 Siemens per meter, with a dielectric constant of 13. In order to minimize the amount of area occupied by the antennas, each computer model utilizes a free-standing central mast, with a diameter of 8 inches. This structure could be a self-supporting tower or metal pole. These are available from a variety of manufacturers.

First Four-Square Design

Figure 1 is a computer-generated drawing of the first design, which is the smaller of the two. This antenna utilizes an 80 foot tower as the central support, with an 8 foot ground rod at the bottom. Each side of the "square" is 48.08 feet long, which places the feed-points of the 4 elements exactly 34 feet from the axis of the tower. At a height of 15 feet above the ground, four 32 foot horizontal "arms" extend outward at 90° intervals. These arms are metallic, but an additional two foot length of non-conductive material must project beyond the end of each metal arm to the actual feed-points of the elements. These four long horizontal arms may be supported by over-head guys, as well as side-guys, if needed. The individual feed-lines for the elements should be run along these arms, with a current balun or choke at each feed-point.

The elements in the computer model of the four-square are constructed from #12 AWG copper wire; each element has a single vertical radiator and two horizontal radials. The radiator wires are 69 feet long, but are not perfectly vertical; instead, they slope inward toward the tower axis, at an angle of 21.8° from the vertical. Four short non-conductive horizontal arms, each projecting outward 8 feet from the center-line of the tower, can provide anchorage for the upper ends of these vertical elements.

The radials, which make up the "sides" of the four-square, are all 43.5 feet long, but are "bent" so that two radials (one from each adjacent element) can "share" one side of the square. From each feed-point, two radials extend horizontally, perpendicular to each other, for a distance of 23.5 feet, and then bend inward at a 90° angle (directly toward the central mast) for another 20 feet. All of the radials are shorter than a full quarter-wavelength, so a loading coil must be placed at each feed-point to reduce the input reactance. In Figure 1, notice that the extreme ends of adjacent radials run parallel to each other, at a spacing of just over one foot. Thus, to avoid computational errors in the model, segment lengths of roughly one foot were used for all of the antenna wires.

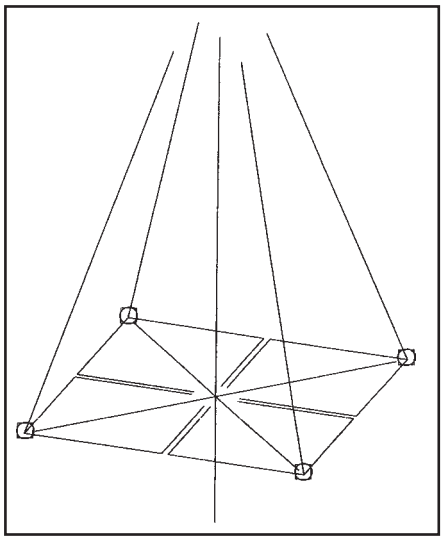


Figure 1—A computer drawing of the first compact four-square design, which utilizes an 80 foot central mast to support the antenna.

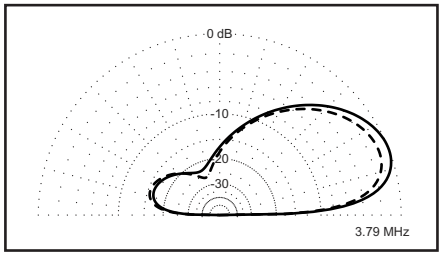


Figure 2—Elevation plane radiation patterns for the first compact four-square design—solid trace: firing through the corner of the square, using current phase-angles of 0°, -125° and -250°—dashed trace: firing through the side of the square, using current phase-angles of 0° and –125°.

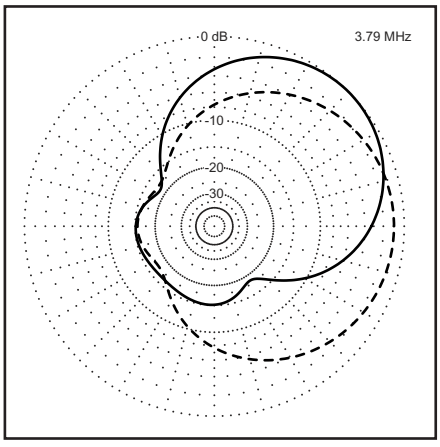


Figure 3—Azimuthal plane radiation patterns for the first compact four-square design—solid trace: firing through the corner of the square, using current phase-angles of 0°, -125°, and -250°—dashed trace: firing through the side of the square, using current phase-angles of 0° and -125°.

Eight Directions of Fire

The parameters of the system were then adjusted to provide the best combination of gain, front-to-back ratio, beam width, and input impedance, when firing through the corners of the array. The final design utilizes equal-magnitude currents for all elements, with a phase-angle of 0° for the rear element, -125° for the two side elements, and -250° for the front element.

The resulting elevation plane radiation pattern is displayed as the solid trace in Figure 2. The peak forward gain is 4.32 dBi at a take-off angle (TOA) of 21°, and the front-to-back ratio (F/B) is 16.34 dB. In the azimuthal plane (the solid trace in Figure 3 shows the pattern) the F/B is also 16.34 dB, while the half-power beam width (HPBW) is 86.6°. Each loading coil has an inductance of 1.26 µH, or a reactance of 30Ω at 3.79 MHz. A series loss resistance of 0.3 Ω was assumed for each coil, yielding a Q of 100. The corresponding input impedances

[1]Notes appear on page 12.

are 34.3+*j*18.6 Ω for the front element, 12.9-*j*15.5 Ω for the two side elements, and -24.7-*j*10.0 Ω for the rear element.

Using these input currents, the beam width of the antenna is less than 90°, which means it is also necessary to drive the array so that it fires through the sides of the square. As before, equal-magnitude currents are used for all four elements, but now there are two "rear" elements and two "front" elements. The phase angle for the rear-element currents is 0°, and -125° is used for the front elements. Now the maximum forward gain is 3.37 dBi at 22° TOA, with an elevation plane F/B of 14.53 dB. In the azimuthal plane, the F/B is 14.57 dB and the HPBW is 122.2°. The dashed traces in Figures 2 and 3 are the corresponding radiation patterns. The driving-point impedances are 62.6-*j*23.6 Ω for the two front elements, and -11.8-*j*56.7 Ω for the rear pair of elements.

Four Directions of Fire

If the operator prefers to have an array that provides good performance with only four directions of fire (through the corners of the square), then the currents can be adjusted to produce a main lobe with less forward gain but greater beam width. To achieve this condition, the current phase angles of the "classic" four-square work well: 0° for the rear element, -90° for the two side elements, and -180° for the front element. In this configuration the loading coils should have an inductance of 2.1 µH, or 50 Ω of reactance at 3.79 MHz. The forward gain is 3.61 dBi at 22° TOA, with a F/B of 17.44 dB. In the azimuthal plane the F/B is 17.48 dB and the HPBW is 110.8°. The main radiation patterns are displayed in Figures 4 and 5. For the front element, the input impedance is 67.9+*j*28.1 Ω, with values of 27.2-*j*25.7 Ω for the two side elements and -37.8-*j*20.8 Ω for the rear element. If an even-broader main lobe is desired, the phase-angles can be decreased still further, with an accompanying reduction in gain.

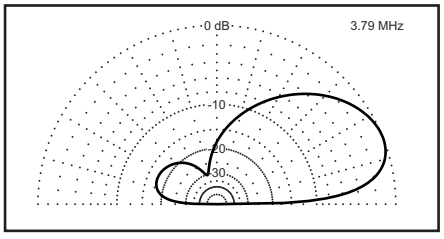


Figure 4— Elevation plane radiation pattern for the first compact four-square design, using current phase-angles of 0°, -90°, and -180° to produce a main lobe with a broad beam-width.

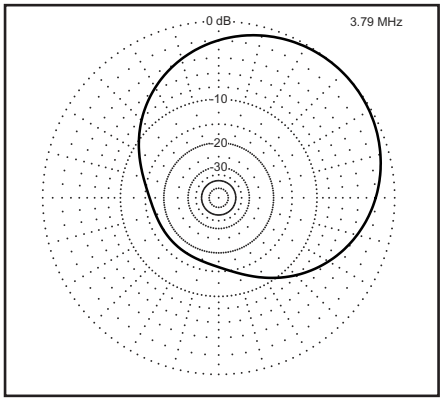


Figure 5—Azimuthal plane radiation pattern for the first compact four-square design, using current phase-angles of 0°, -90°, and -180° to produce a main lobe with a broad beam-width.

Second Four-Square Design

Inspiration for the second design came from an on-line article by L. B. Cebik, W4RNL[2]. This larger antenna (shown in Figure 6) requires a 120 foot tower as the central support, and again an 8 foot ground rod is installed at the base. As before, each side of the four-square is 48.08 feet long, placing the feed-points of the 4 elements 34 feet from the axis of the tower. In this design, full-size half-wave elements are used, with the feed-points located 64 feet above the ground. At this height, four 32 foot horizontal arms extend outward at 90-degree intervals. Again these "arms" are metallic, with an additional two foot length of non-conductive material projecting from the end of each metallic arm to the actual feed-point of the element. These arms will need to be supported by overhead guys, and probably by side-guys as well. The feed lines for the elements run along these "arms", with a current balun or choke at each feed point.

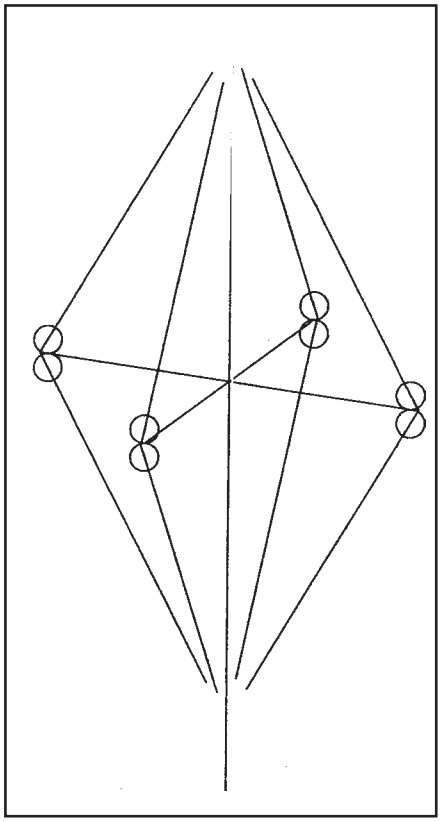


Figure 6—A computer drawing of the second compact four-square design, which utilizes a 120 foot central mast to support the antenna.

The elements of the four-square are constructed from #12 AWG copper wire. Each element is a half-wave vertical radiator that is fed in the center, and there are no radials. For this application each element-half is 61.5 feet long, but the wires are not perfectly vertical. Rather, they slope inward from the feed-point toward the tower axis, at an angle of about 29.5° from the vertical, so that the included angle between the two legs of the "vertical vee" is almost 121°. Four short non-conductive horizontal arms, each projecting outward 2.27 feet from the centerline of the tower, can provide anchorage for the upper ends of the vertical elements if installed at the apex height of 120 feet. Identical arms at a height of 8 feet will serve as tie-off points for the lower ends of the wires.

Eight Directions of Fire

The parameters of the system were then adjusted to provide the best combination of gain, F/B, beam width, and input impedance when firing through the corners of the array. The final design utilizes equal-magnitude currents for all elements, with a phase-angle of 0° for the rear element, -135° for the two side elements, and -270° for the front element. Because full-size elements are used in this larger antenna, no loading coils are needed.

The elevation plane radiation pattern for the array design is displayed as the solid trace in Figure 7. The peak forward gain is 5.48 dBi at a TOA of 18°, and the F/B is 23.54 dB. In the azimuthal plane, the F/B is 23.56 dB, while the HPBW is 86.8°. This radiation pattern is the solid trace shown in Figure 8. The input impedances are 4.8+*j*33.1 Ω for the front element, 23.0-*j*17.7 Ω for the two side elements, and -7.8-*j*16.0 Ω for the rear element.

When driven with these input currents, the beam width of the antenna is less than 90°, so it is also necessary to reconfigure this array to allow it to fire through the sides of the square. As before, equal-magnitude currents are used for all four elements. The phase-angle for the two rear element currents is 0°, with -135° used for the two front ele-

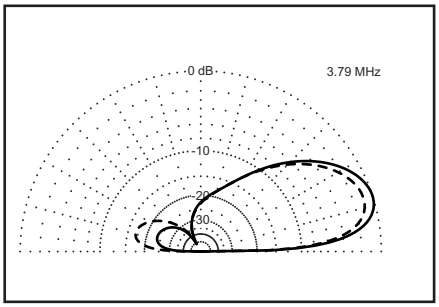


Figure 7—Elevation plane radiation patterns for the second compact four-square design—solid trace: firing through the corner of the square, using current phase-angles of 0°, -135°, and -270°—dashed trace: firing through the side of the square, using current phase-angles of 0° and -135°.

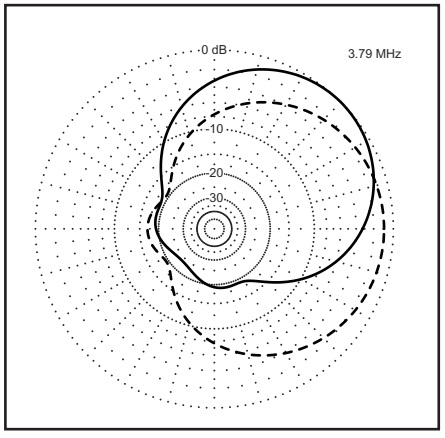


Figure 8—Azimuthal plane radiation patterns for the second compact four-square design—solid trace: firing through the corner of the square, using current phase-angles of 0°, -135°, and -270°—dashed trace: firing through the side of the square, using current phase-angles of 0° and -135°.

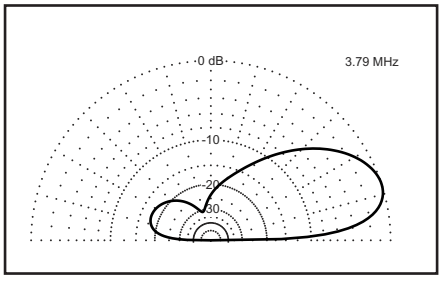


Figure 9—Elevation plane radiation pattern for the second compact four-square design, using current phase-angles of 0°, -105°, and -210° to produce a main lobe with a broad beam-width.

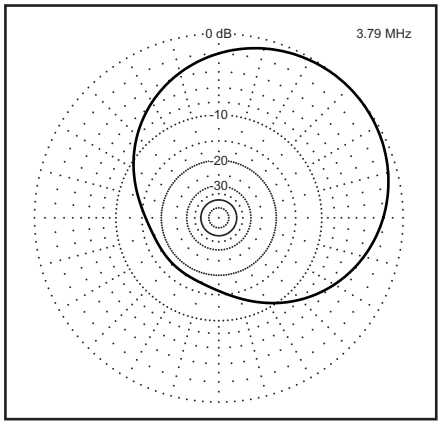


Figure 10—Azimuthal plane radiation pattern for the second compact four-square design, using current phase-angles of 0°, -105°, and -210° to produce a main lobe with a broad beam-width.

ments. Now the maximum forward gain is 4.57 dBi at 18° TOA, with an elevation plane F/B of 15.94 dB. In the azimuthal plane, the F/B is 15.98 dB and the HPBW is 122.0°. Figures 7 and 8 include the corresponding radiation patterns, shown as a dashed line. The driving-point impedances are 75.3+*j*29.7 Ω for the front pair of elements, and 5.7-*j*54.0 Ω for the two rear elements.

Four Directions of Fire

As was true with the first design, it is entirely possible to modify this larger array so it provides good performance with only four directions of fire. Of course, the resulting main lobe will have less forward gain, but a larger beam width. In this scenario, the current phase-angles are selected as 0° for the rear element, -105° for the two side elements, and -210° for the front element. The forward gain is now 4.84 dBi at 18° TOA, with an elevation plane F/B of 17.64 dB. In the azimuthal plane the F/B is 17.87 dB and the HPBW is 111.0°. The important radiation patterns are displayed in Figures 9 and 10. For the front element, the input impedance is 39.8+*j*65.4 Ω, with values of 54.1-*j*38.3 Ω for the two side elements and -22.9-*j*44.2 Ω for the rear element. Again, a broader main lobe can be produced by further decreasing the current phase-angles, although this reduces both the forward gain and the front-to-back ratio.

Conclusion

This article has shown how to construct several different compact four-square phased-vertical arrays that fit into a 50x50-foot plot of land. Their performance is inferior to that of a conventional ground-mounted antenna, but only $^1/_{16}$ as much space is required.

Notes

[1]*EZNEC* is available from Roy Lewallen, W7EL, PO Box 6658, Beaverton OR 97007.

[2]L. B. Cebik, W4RNL, "Pursuing the (Nearly) Perfect Parasitic Vertical Array for 160 Meters, Part 1: A Review of Design and Modeling Techniques," **www.cebik.com/160sa.html**

NCJ

Bill Fisher, W4AN, Silent Key

Rick Lindquist, N1RL

The contesting community has lost another of its best. Bill Fisher, W4AN (ex-KM9P), of Alpharetta, Georgia, died unexpectedly April 4. He was 41.

Bill was an enthusiastic radio amateur whose call sign often graced the upper echelons of the contest results. Fisher and fellow Georgian John Laney, K4BAI, took the silver medal at World Radiosport Team Championship '96 in the San Francisco Bay area. The pair also competed in WRTC-02 in Finland as OJ3D. "It is with the deepest regret imaginable that I must report the unexpected death of my dear friend and fellow amateur, W4AN," Tom Rauch, W8JI, said in a posting to the CQ Contest Reflector. "Bill was a good friend of mine, and he was a great asset to the community." Fisher's death comes as the contesting community is still recovering from the untimely death of Jim White, K4OJ, in February.

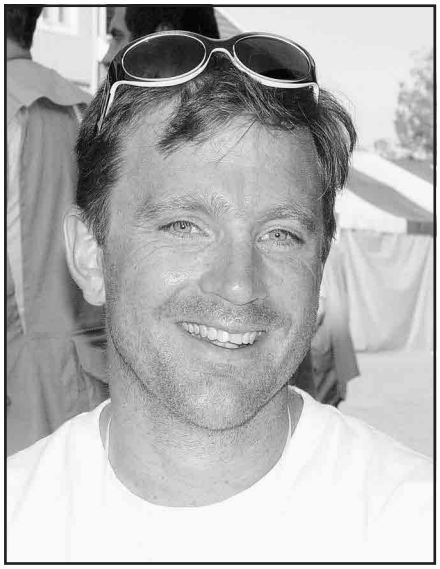
In addition to his contesting activities, Fisher was the founder of the **Contesting.com** Web site. Along with Garth Hitchens, KG7GA, Randy Thompson, K5ZD, and Trey Garlough, N5KO, he helped to establish the popular **eHam.net** Amateur Radio site in 1999. In addition, he personally supported contesting reflectors via his own servers.

"I will miss his leadership," said eHam Site Manager Mike Gilmer, N2MG. "Bill had a way of low-pass filtering the noise from both the users of eHam and the site team and trying to maintain focus. Mostly I will miss him as a friend, fellow ham and contester, and straightforward guy."

During the 1980s and 1990s, he contributed more than a dozen articles to the *National Contest Journal*.

Dave Pascoe, KM3T, said his friendship with Fisher extends back more than 20 years. "I knew of nobody as generous with his time and with as unique a personal touch as Bill," he said. "Many will never know nor comprehend the amount of time and resources he poured into this hobby of ours." Pascoe said the world may never see a more accomplished CW contest operator than W4AN. "Bill's skills were uncanny, and he was always and will forever be an inspiration to me and I am sure many others."

Pete Smith, N4ZR, said he was stunned to learn of Fisher's death. "Like many of us, I never met Bill face-to-face, but we used to chase DX together on 80-meter CW, and I frequently found myself near him during contests," he said. "He was always a gentleman and a competitor, never just a competitor."



Fisher had established a top-flight contesting station on a hilltop in the mountains of north Georgia near Dahlonega that sported six towers plus a four-square array for 80 meters. When he was not contesting, he operated the station from his home via a telephone link, since antenna restrictions prevented him from putting up outdoor antennas.

"Not many know that Bill was a pioneer in the development of hardware and software for operating remote stations," said Ward Silver, N0AX, who edits the *ARRL Contester's Rate Sheet*. "In 1995 and 1996, Bill and a team including Garth, KG7GA, developed a remotely-operated, full kilowatt station sufficiently capable for K7SS to operate a sprint station by telephone—truly state of the art at the time." Silver said Fisher's legacy is not only dreaming about pushing the envelope, but making those dreams happen.

Fisher also occasionally operated vintage gear from home using attic antennas. More recently, he was said to be dismantling his contest station as part of a plan to combine forces with W8JI and establish a contest superstation.

Fisher was a member of the South East Contest Club, the South East DX Club, the First-Class CW Operators' Club (FOC) and the A-1 Operator Club. In addition to being a ham radio contester, he was an avid bicycle racer.

In his professional life, Fisher was founder and Vice President of Concentric Systems Inc of Alpharetta—a supplier of custom-built PCs to computer resellers. He also established and served as president of Akorn Access Inc—an Internet service provider and consulting company.

Survivors include his wife, Dana and their young sons Graeme and Erik.

The W4AN Memorial Fund for Graeme and Erik Fisher has been established to benefit Fisher's children. Donations are welcome to North Atlanta National Bank, 10500 Old Alabama Rd Connector, Alpharetta, GA 30022; tel 678-277-8400. Make checks payable to "W4AN Memorial Account" and include the account number, 20005913, on the check "memo" line. NCJ

Visalia 2004

By Ward Silver, NØAX

First: if you haven't "done" Visalia, put it on your list of ham events to attend at least once. All the Big Guns on the West Coast are there and many more from around the world—you'll enjoy putting a face with the calls. The programs are tip-top and the dinner banquet alone usually has more than 500 folks in attendance. Wow! You can drive down (easy two-day drive from the Northwest, or a few hours from Los Angeles or San Francisco) or fly in (Fresno is 30 miles away). Golfers can take in the tourney on Friday morning, too!

This year's event (**www.scdxc.org/visalia**), hosted by the Southern California DX Club (SCDXC), was spectacular in the weather department—solid sun and clear skies for the entire weekend. Friday morning, Garry, NI6T, and I joined up with Tom, NW6P, and boogied across the state to Visalia. It's about a 3-1/2 hour drive from the San Francisco Bay area to Visalia through some visually stunning landscapes. Make the drive sometime and you'll really enjoy it. Afterwards, we all headed for poolside and an open bar, courtesy of RadioDan, the SCDXC and the Piña Colada Contest Club.

Attitudes adjusted, it was time for the Friday night Contesters Dinner, where yours truly was the featured speaker. Most folks seemed to overlook that misfortune and we all had a good time. My talk was on "What Makes a Good One?" in memory of the departing friends in the contest community like W7BX, W4AN and K4OJ this year. Friday night also features the FOC dinner, an IOTA dinner and a gathering of Topbanders at a local restaurant,

so whatever your cup of tea on the bands, there is an event for you.

On Saturday, you start by grabbing a quick breakfast and heading for the introductions. This year, an interesting feature was added—a forum for vendors to spend a few minutes introducing their new products. The two that caught my eye were the Force 12 Tornado antenna tuning unit and a new wattmeter by Alpha Power. (For a complete list of the vendors and their products, browse to **www.scdxc.org/visalia/spon-vend02.html**) There is a substantial presence of serious vendors with their newest gear and generously supporting the convention with a great list of prizes. (Speaking of prizes, Herb, KG6OK, did another excellent job this year, but was diagnosed with a serious illness just before the convention—best wishes for a speedy recovery, Herb!)

The Contest Forum and DX Forums took the schedule up to lunchtime. One of the big pleasures of Visalia is the free BBQ hosted by US Towers, just a couple of miles away from the hotel. You can check out all of their latest products and some mighty nice towers while munching on roast beef, potato salad and BBQ beans. It's very much appreciated by all and well attended.

After lunch, programs ranged from DXpedition coverage, to Topband mobiling by KH6DX, to antenna theory by N6BV. (For the list of programs, check out **www.scdxc.org/visalia/sched.html**.) W6NL introduced his new Moxon-like 40-meter beam design. You will be hearing a lot more about this 2-element antenna that has great performance and is mechanically superb. My own contribution was a presentation on "Trends in Contesters and Contesting" that discussed where we are today and hopefully made some thought-provoking suggestions about where the sport might meander in the coming decade. We have lots of opportunities and obligations to take care of our favorite activities as the elders of the tribe.

Saturday evening is the Big Show as there is another attitude adjustment opportunity hosted by HRO and the SCDXC. This is followed by the huge banquet attended by hundreds of people. The theme was "Hawaii Night" and you can only imagine the scene as nearly 600 aloha-shirted Big Guns packed the room. This year's featured speaker was Chip, K7JA, as he told the story of the COØUS/T42FD Field Day operation. Following the banquet, the Northern California Contest Club hosted a hospitality suite that lasted into the wee hours, as I can personally attest. Yes, things got just a little silly.

Sunday morning's breakfast was another food fest (I'm sure I put on a couple of pounds over the weekend) with a very interesting program. John, K6AM, hosted the finals of "Who Wants to Be a DX Millionaire" which is based on the TV show. That was followed by N7CQQ giving the details on the recently concluded 3B9C expedition. What an effort that was! It's an excellent program if you get the chance to see it. All too soon, it was checkout time and we scrambled for the exits. The hotel staff did an excellent job all weekend long and made the whole thing run extremely smoothly. SCDXC did a bang-up job playing host, keeping everything on time and exceeding everyone's expectations. A job well done by all the attendees!

Put next year's International DX Convention on your calendars now—April 15 through 17—and join the fun! NCJ

The VHF QRP Portable Category — Into the Second Decade

Kevin Kaufhold, W9GKA

History of QRP

Portable activities on VHF have a long and rich history. As far back as the earliest days of 5-meter activity, amateurs took equipment to remote locations. The first reported portable "UHF" mountaintop expedition took place in April 1927 when tests were conducted between Schenectady, New York; Mt Whitcomb in Massachusetts; and Mt Mansfield in Vermont.[1] In 1931, ARRL technical staff designed 5-meter transmitters and receivers for portable use in car and airplane tests, and this equipment proved wildly successful, sparking further interest in UHF.[2] Using this portable equipment, one radio club in New Jersey even utilized several fire lookout towers for 5-meter tests conducted on Washington's Birthday in 1932.[3]

The first real VHF contest-oriented activity in the US was conducted in September 1939, and was styled as a "U.H.F. Relay." The event was notable for its high scorer, who operated from a Plymouth coupe! In an amazing portable effort, Goyn Reinhardt, W3AC/3, strapped a homemade 56 Mc. array to the side of an elevated deck at High Point State Park in New Jersey, and made a grand total of 308 points.[4]

Portable operations continued over the years. The first September QSO Party in 1948 was won by Jim Thayer, W1FZ, operating from the summit of Blue Job Mountain in New Hampshire. Driving a 180 pound, 500-W gasoline generator to a fire lookout tower at the mountain site, Thayer worked 130 contacts in 15 sections on 50, 144, and 235 Mc.[5] Portable and mobile activity continued in popularity in subsequent contests, especially in the June VHF QSO Party where favorable weather and propagation conditions made portable efforts very enjoyable.

The QRP Portable category began as a separate class during an era marked by category expansion and increased contest variety. The QRP category made its debut in the September VHF QSO Party of 1986. Entries had to run 10 W PEP or less from a temporary location and with a portable power source, equipment, and antennas. The first QRP contest had 11 participants and 12 log entries, with a cumulative total of 17,665 points. K6LMN, running from Santa Clara Valley, won with 6,536 points. QRP was added to the June VHF QSO Party in 1987. Clarke, K1JX, of Connecticut won the category with an incredible score of 120,268 points. He would go on to establish further QRP records in both the September 1987 and June 1988 VHF events.[6] The QRP class was added to the January VHF SS in 1989, and K6LMN, then operating from San Diego, also won this contest with a modest 4,800 points. The category was renamed in 2001 to "Single Operator Portable," but continued with the same basic QRP and portable rules.[7]

Data Analysis

The QRP category provides an ideal setting for basic data analysis, both due to its compact size and because the category has existed for over 15 years with no major changes in its composition. I have placed every single QRP entry since 1986 for the January VHF SS, the June VHF QSO Party and the September VHF QSO Party into an Excel spreadsheet, listing the call signs, scores and sections of all entries. The statistics and findings of this article are gleamed from output of that spreadsheet.

In developing the data for this article, a few strategic decisions were made regarding the appropriateness of certain scores. The numbers and statistics of this article are therefore dependent upon those decisions, and other writers could produce somewhat different totals by making alternate decisions. Specifically, the June 1986 QRP scores are not included, due to the QRP category becoming effective only in September 1986.[8] Two-person and multi-op QRP scores are also excluded, as the League considers these entries to be in the multi-op category.[9] Multiple QRP entries by one operator in the same contest are included, however, as such activities have been considered to be separate QRP entries.[10] Another decision involved call signs utilized. Generally, the scores have been counted towards the guest operator's call sign, and not the station call sign or special event call sign used.

Verification of data is always important when dealing with the manual processing of numbers. The task of accuracy in the numbers is especially important here, since data collection and input was a painstakingly slow endeavor, prone to numerous mistakes. Considering these obstacles, I took several steps to internally and externally verify the data.[11] Ultimately, some 578 call signs and / or line scores in the spreadsheet were ultimately cross-checked (representing over 40% of all QRP log entries in the spreadsheet). Only 19 call signs, or 3.3% of all calls in the spreadsheet, were found to be in error. Twenty-six logs (1.9% of all log entries) were in error as to the score, resulting in an increase of 5881 points in the score totals and an absolute value change in scores of 6105 points. This is less than 1% error in the line scores. This low error

Table 1
QRP Points, by Year and Contest

Year	*Jan*	*June*	*Sept*	*Ttl Pts*	*Pts/Log*	*Pts/Op*
1986			17,665	17,665	1,472	1,606
1987		162,609	61,876	224,485	6,803	8,634
1988		431,276	9,245	440,521	8,990	**12,586**
1989	10,608	68,984	22,425	102,017	1,342	2,267
1990	57,086	196,178	83,290	336,554	3,400	5,803
1991	62,423	215,641	107,762	385,826	3,937	5,434
1992	64,442	408,419	169,183	642,044	8,676	10,701
1993	77,785	231,963	183,308	493,056	5,540	7,044
1994	54,161	219,919	290,912	564,992	6,570	7,958
1995	115,700	347,239	292,127	755,066	6,991	8,989
1996	**179,027**	**551,274**	156,861	**887,162**	**9,438**	11,090
1997	177,978	306,279	**392,639**	876,896	8,858	10,826
1998	74,369	291,764	264,080	630,213	7,878	9,268
1999	27,658	148,799	87,070	263,527	3,875	4,972
2000	67,039	229,966	31,558	328,563	4,904	6,571
2001	47,926	381,748	114,177	543,851	8,117	10,071
2002	120,611	380,619	77,988	579,218	8,776	11,821
2003	35,289	439,427	200,372	675,088	8,767	10,889
2004						
Total	1,172,102	5,012,104	2,562,538	8,746,744		
Pts/Log	2,818	9,351	6,571	6,518		

[1]Notes appear on page 18.

rate in both the call signs and scores lends credibility to the overall numbers presented in this article.

The Numbers

A total of 8,746,744 QRP points have been scored in all ARRL VHF contests since 1986. That is a lot of points by any account! High scores and ratios in Table 1 are highlighted in bold.

As can be seen in the Table 1, the scores initially built up from modest levels, and then peaked in 1996 for the January and June contests and in 1997 for the September event. Cumulative yearly scores and the average points per log entry peaked in 1996. Because of enhanced propagation abilities, the June QSO Party has garnered the largest points per year, although the September VHF QSO Party has also produced produce significant results at times. Not surprisingly, the January VHF SS has the lowest QRP cumulative scores. Considering the bad weather conditions and poor propagation generally existing in January, it is amazing to see just how many QRP points can still be scored in the VHF Sweepstakes. The yearly cumulative totals are displayed in Figure 1.

Turning now to participation levels, 1342 QRP logs have been submitted in the three ARRL VHF contests having a QRP category. This is an incredible number of QRP logs, especially when one realizes that the large amount of entries have been generated by only 560 individuals. This demonstrates that a relatively small group of people has generated all QRP activity over the last 50 contests. In spite of the large aggregate totals, the number of QRP entries in any one contest is rather small. Having only 20 to 30 QRP entries in a single contest makes the category exceedingly tiny and almost insignificant compared with the total number of points scored in any one VHF contest. An increase in the QRP entry levels would certainly help firm up competitive levels and smooth out many of the large fluctuations in points and operator statistics. The QRP log entries for each contest are shown in Table 2.

The total number of cumulative log entries per year and the number of operators per year both peaked in 1995 at 108 logs and 84 operators, respectively. The number of entries in the January and September contests both peaked in the mid 1990s as well, while the popularity of the June contest reached a zenith much earlier in 1990.[12] In terms of log entry distribution between the contests, the June event enjoys the greatest popularity among QRP operators, although both January and September have good support, too. The number of log entries and the number of QRP operators supporting the contests on an annual basis can be seen in Figure 2.

Trends In The Numbers

Putting all of the numbers together, a clear and unmistakable trend can be ascertained. The total amount of yearly QRP points, log entries, and operators submitting QRP scores steadily increased from the start of the QRP category in 1986 until the 1995-1997 time frame. Since that time, all three critical indicators of cumulative points, the number of log entries, and the number of operators submitting log entries have fallen off considerably. Most recently, there have been small increases in the log entries and the number of operators submitting logs, and with the cumulative points greatly increasing since hitting a low in 1999. This fall-off in participation levels and point production is quite consistent with overall trends in the VHF contests.[13] Indeed, the severe drop in annual QRP scores after 1997 may be more pronounced than the general trend in VHF contests, as there have been increases in total contacts and QSO points generated in all VHF contests over the last several years.[13] The more recent build up of QRP points in spite of declining to stabilizing log entries is probably due to the increasing use of microwave frequencies by QRP enthusiasts, and this is also consistent with overall trends.

What really matters to the continuing success of any contest is the number of individuals regularly participating and supporting it, not the number of call signs submitting the logs, nor the number of log entries or cumulative points. Due to the compact nature of the QRP category, the *Excel* spreadsheet used to generate the information and numbers for this article has been able to identify not only participating call signs, but also the number of

Table 2
Log Entries and Operators, by Year and Contest

Year	*Jan*	*June*	*Sept*	*Total Logs*	*Total Ops*	*Lgs/Ops*
1986		12	12	11	1.09	
1987		15	18	33	26	1.27
1988		38	11	49	35	1.40
1989	16	31	29	76	45	1.69
1990	29	**48**	22	99	58	**1.71**
1991	47	33	18	98	71	1.38
1992	15	31	28	74	60	1.23
1993	29	34	26	89	70	1.27
1994	24	30	**32**	86	71	1.21
1995	**48**	38	22	**108**	**84**	1.29
1996	33	38	23	94	80	1.18
1997	41	36	22	99	81	1.22
1998	32	29	19	80	68	1.18
1999	25	22	21	68	53	1.28
2000	18	29	20	67	50	1.34
2001	14	26	27	67	54	1.24
2002	20	27	19	66	49	1.35
2003	25	31	21	77	62	1.24
Total Logs	416	536	390	1342		
Total Ops (across all years)				560		
Total Log / Op (across all years)				2.40		

Note that 560 Total Ops represents the total number of unique operators submitting at least one QRP log entry across all years of VHF contesting, and will not sum to the number of ops submitting logs in any one year. This is because many of the same people will submit logs across several years.

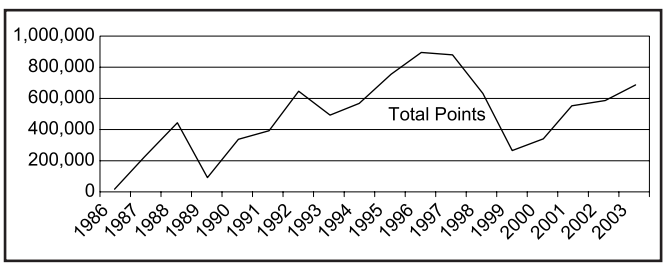


Figure 1—Cumulative QRP Points, by Year

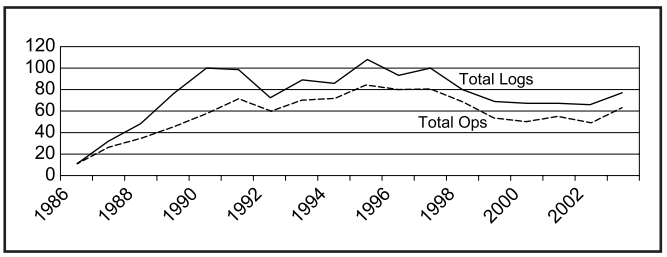


Figure 2—Cumulative Log Entries and Operators, by Year

individual operators who have actively supported the QRP category. This identification of individuals, as opposed to call signs, has been made possible through a cross check of past and current call signs in the FCC database, as well as by keeping a close track of the individuals who regularly operate in the QRP category.[15] On an important note, the number of individuals supporting the category has risen and fallen in the same general fashion as has the number of log entries. This has been presumed to be the case with all VHF categories and in all VHF contests, but has never been statistically shown before to my knowledge. The actual number of individuals supporting the category initially swelled in the late 1980s but then topped out by the mid 1990s, with a sharp decline occurring thereafter. Most currently, the number of individual entrants in the QRP category shows some evidence of bottoming out and stabilizing, as displayed in Figure 2. [16]

The search for reasons and causes producing the sharp increase and subsequent drop off in individual participation levels has become a most perplexing matter and the subject of great debate. A number of possible explanations have been proffered for the phenomenon, but no rationale has as of yet gained a consensus of support and belief within the VHF community. Some experienced contesters contend that the extensive rules set and all-inclusive nature of the ARRL contests may be keeping away many amateurs who have been recently testing out their HF + VHF rigs on 6 and 2 meters. Others cite to the contests developing into *de facto* microwave events coupled with the lack of award incentives for those contesters operating on only the VHF bands.

I have written extensively on technological and demographic impacts being the driving forces for the vast swings and booms in operator participation since the start of VHF contesting in 1948 (see note14). Whatever the reasons for the trends, the general concern as to declining contest participation is actually heightened by my above finding that a decline in the number of individuals supporting the QRP category has essentially been behind the decline in the number of log entries, the number of call signs submitting logs and the number of cumulative points scored in the contests. If this finding can be extended beyond the QRP class and to all VHF categories, it is most troubling indeed. As individual interest waxes and wanes, so does all of contesting. The available data generates some other interesting observations, summarized below.

A Category Of Endurance And Fun

A recurring theme among all QRP contestants is the enormity of weather and equipment considerations. Many QRP Portable operators are much more concerned about Mother Nature and the working order of their equipment than they are about the other competitors in the class, or even their final scores. Just finishing a contest can be a major accomplishment at times, and category participants have routinely commented on their struggles and triumphs over weather and equipment alike. While participants of the category put up with any number of physical challenges, there is also a great sense of adventure and fun. Exotic and remote locations with impressive vistas and natural surrounding are regularly chosen for many QRP efforts.

Most Try The Category Only One Time

The number of regular contest operators is the critical determinant in the overall integrity and vitality of any class or category, as the more times that a person participates in a class over a number of years, the more solid the category's composition will be. Unfortunately, roughly two-thirds of all QRP operators attempt the category only one time. Some 345 operators out of a total of 560 ops submitting QRP scores across all years have ran the class in only one event. This represents 61% of all entrants. The same pattern exists over the most recent five-year period, with 114 of 169 ops with QRP scores in the last five years running the category only once, or 67% of all participating individuals. This non-return rate across all years, and in the last five years, is quite high. This could be due to the harsh weather conditions and stringent equipment requirements that VHF QRP enthusiasts undertake.

Most of the operators posting only one log entry have had quite small scores. Three hundred and three operators with only one QRP entry across all years have submitted scores of fewer than 5000 points, and 207 of those individuals have generated scores of under 1000 points. While the vast majority of the operators trying out the QRP category only once had small to tiny scores, a few posted tremendous efforts. Thirteen operators who operated QRP only one time in the past 50 VHF contests had a single contest score of over 20,000 points, and two amateurs ran over 50,000 points. Given the right location and good band conditions, a major QRP score can certainly occur even with a one-time only entry, swiftly propelling the operator into the status of a "QRP superstar."

Impressive Point Totals Can Be Had

Even though the category is limited to 10 W, experiences Field Day like conditions in summer and blizzard-like conditions in the winter, and requires all the equipment, power, antennas, and locations to be temporary and portable in nature, the scores can be quite large upon occasion. Many ops will produce high scores by staking out very high ground, and this makes the hunt for great locations a critical feature of the portable category.

Since the start of the category in the 1980s, 54 entries with scores of 5000 or more points have occurred in the January VHF SS, and two even went over 50,000 points. Seventy-four QRP entries have topped 20,000 points in the June event and six have exceeded 100,000 points. Fifty-six entries have had at least 10,000 points in the September contest, and three went over 100,000 points. Many people would be ecstatic to have these kinds of scores for either the SO or Multi-ops categories. The fact that these results have occurred in the QRP category shows that operators with limited equipment and power levels can still run huge numbers. Who says that armchair contesting with kilowatts is the only way to go on VHF! Operator skill levels shine through and are readily apparent in the QRP category.

Geographic Dispersion Exists

No one section or division has a lock on the top QRP scores. In fact, the category has had large scores from 37 separate ARRL sections since 1986, and there has at least been some activity in most of the sections. This is quite curious, since one would think that the North East Corridor would dominate the QRP category. Tall mountain locations coupled with a high population density and great VHF activity should presumably make for ideal QRP conditions. To be sure, the North East has had some great operators cranking out wonderful scores and contest records. Individuals in Connecticut have been responsible for 24 top QRP scores from that one section alone, while operators in Vermont have produced 13 top scores. Right from the start of the category however, the West Coast has run some great numbers. Ops in various sections of California have pushed out 31 very high scores over the category's life, with four of those scores being national records.

Operators from low population density areas such as Arizona, Montana, Arkansas and British Columbia have even been able to post strong contest results. In my own section, Illinois, four operators are currently among the "55 regulars" actively supporting the category. Even the League's initial prediction that the January VHF SS would pose too many hurdles for amateurs in northern climates was recently proved wrong, with one operator from Minnesota claiming the highest score in the nation for the 2004 January contest.[17]

A Few Regulars Sustain The Category

Fifty-five individuals have run two or more QRP contests in the last five years. These "55 regulars" form the real core

and nucleus of the category, as they have been responsible for most of the recent QRP log entries, total points, and section, division and top national scores. In a very real sense, these ops are the QRP class. While others may try out the category from time to time, these few ops have been consistently driving the competitive fires of the category.

In any one contest, however, even the regulars are few in number. Over the last five years, the January VHF SS has had between 14 and 25 QRP entries, averaging 20.4 QRP entries per contest. The June VHF QSO Party has experienced between 22 and 31 entries, averaging 27.0 entries. The September event has seen between 19 to 27 entries, with a mean average of 21.6 entries.

The regulars are a loyal and dedicated bunch. Over the most recent 15 contests, these 50 plus ops, comprising only 32.5% of the operators entering the QRP category, had 231 contest log entries (66.9% of the total entries in the last five years) and were responsible for 1.797 million points (75.1% of all QRP points scored in the last five years). That is quite a collective accomplishment, since an individual or even a cumulative score of 5000 or more points is considered quite large for the category. As is the case with many other areas of contesting and amateur radio in general, a few highly motivated individuals account for the vast amount of activity and enthusiasm.

Notes

[1]Over three weekends in April 1927, F.G. Patterson took a 5-meter receiver by car and by foot (in snow, too!) to both the Mt. Whitcomb observation tower and the Green Mountains in Vermont to hear 50-W transmissions from A.H. Turner, 10 miles north of Schenectady, NY. Received distances were 50 miles to 150 miles. "5-Meter Work at 2XM with Crystal Control," A.H. Turner, *QST,* June 1927, p.24-26.

[2]"Developments in Ultra-High Frequency Oscillators", *QST,* July 1931, p.9-20; "Five Meter" Receiving Progress, *QST,* July 1931, 21-25; "Duplex Phone on 56 Mc", August 1931, p. 9-13.

[3]"The Bloomfield Radio Club's "Five-Meter" Field Day", *QST,* May 1932, p.22-24. One of the locations was at High Point, NJ, soon to become famous in the 1939 UHF Relay as the site of the leading scorer in the event.

[4]See, "The U.H.F. Relay!" *QST,* Nov. 1939, p.26-27+. This first UHF event is considered the granddaddy of the VHF SS and QSO Party system. See, "20th ARRL VHF Sweepstakes Results," QST, June 1967, p.66-74, at 66. An interesting retrospective of the 1939 U.H.F. Relay is at "Echoes of the Past," *QST,* June 1995, p.48-49.

[5]Continuing with the portable nature of the effort, antennas were mounted on the side of the tower's windows and through a trap door in its roof. A total score of 2070 points was achieved. Taken from "September V.H.F. QSO Party," *QST,* Feb. 1949, p.69+, at 69.

[6]K1JX's 1988 June record of 137,409 points was only recently broken some 14 years later in 2002, by Pete, K9PW. Incredibly, K1JX has only entered the QRP category on the three occasions that he set records. Three entries, three records.

[7]Along with the name change, the rules were clarified to show the category was by then considered to be for only fixed-station portable efforts; that the operation must take place away from a permanent station location; and that the station could not change from a 500-meter diameter circle. See, "September 2000 VHF QSO Party Results," *QST,* March 2001, ARRL on-line posting.

[8]See, "Results, 1986 June VHF QSO Party," *QST,* Sept. 1986, p.94-98, at 94.

[9]An early contest write-up noted that the QRP Portable was for single ops only. See, "Results, 1987 June VHF QSO Party," *QST,* Sept. 1987, p.78-83, at 78. The League then asked for comments on whether two person QRP efforts should count. "Results, 1988 June VHF QSO Party", *QST,* Dec. 1988, p.95-100, at 96; and also in "Results, 1989 September VHF QSO Party," *QST,* Jan. 1990, p.76-79, at 77. No changes were ever made, and the occasional two-person QRP entry was classified as a multi-op entry.

[10]The practice of multiple QRP entries was quite common in the early years of the QRP category prior to the adoption of the rover rules in 1991. QRP grid mobiling declined dramatically after rovers became official.

[11]Special thanks go to Curt Roseman, K9AKS, who provided access to his collection of calls and record section scores for all VHF categories, and gave valuable comments in the preparation of this article. Thanks also go to Bob Witte, K0NR, for reviewing a draft of this article for technical accuracy.

[12]This is due to the multiple entry mobiling activity much in vogue before the development of the rover category. If QRP grid mobiling is momentarily excluded from the data, the number of log entries in the June contest would also have peaked in the mid 1990s, just as is the case in January and September.

[13]For a discussion of cyclical booms in VHF contesting, see: "Trends in VHF Contesting," *NCJ,* Jan/Feb. 2004, p.6-8; and "Trends in VHF Contesting, Part II," *SMC Black Hole,* Jan. 2004, p.3+, available on line at **www.w9smc.com/blackhole/04-01.PDF**.

[14]Very nice graphical information on increases in QSO points between 1999 and 2003 on the 222 to 10GHZ bands can be found at "2003 September VHF QSO Party Results," *QST,* March 2004, p.104-105. The graphs in that article clearly show that per band QSO points aggregated across all categories have risen since 1999.

[15]Comparing the FCC database against the *Excel* spreadsheet identified 21 instances of the same person using two or more call signs for QRP entries in the various VHF contests. Additionally, close reviews of the line scores showed five instances of four different individuals using various station or special event calls in guest ops situations, as well as 125 multiple entries from 33 ops. The spreadsheet was thus able to identify 560 individuals who accounted for virtually all of the 1342 log entries and 8.7 + Million QRP points over all VHF contests since 1986.

[16]Comparing the actual contest logs against data used in this article would be ideal for ascertaining whether the trends in the numbers also exist with ops who run a contest but do not submit an entry. Unfortunately, such a comparison is not possible, as no review of actual log entries was done for this article.

[17]In announcing the expansion of the QRP category to the January VHF SS, it was noted that QRP in January "will probably appeal only to those in warm weather climes. Or do we have some hardy souls out there with snow shoes and dog sheds?" "Results, 1988 September VHF QSO Party", *QST,* Jan. 1989, p.97-101, at 99. Some 16 years after that rhetorical comment was made, KF0Q from Minnesota has now claimed 23,400 points in the latest January event. He has some interesting comments on his efforts at the ARRLWeb in the soapbox section of the 2004 January VHF SS contest.

NCJ

SO2R Station Design Considerations Part 2—Audio Switchology —Is there a *Best* Approach?

By Hal Kennedy, N4GG

In Part 1 of this article we took a look at consciously laying out an SO2R station so as to allocate the most complex and most frequent manual tasks to the dominant hand. Here in Part 2 we will look at a more complex subject—allocating and switching the audio from two receivers to your ears. As in Part 1, the presented data is a compilation of responses received from SO2R contesters who responded to a survey on the *cq-contest* reflector at **contesting.com**.

Background—SO2R Audio Switching

It is possible to develop a simplistic view of the possibilities for audio switching. Two receivers and two ears—this is simple, yes?

A review of the advertising for the commercially available SO2R station controllers can reinforce the belief that there is not much to it—the basic approach being to put the left receiver in the left ear, the right receiver in the right ear, and allow manual selection of a few options. Typical options include the allocation of both ears to one receiver and enabling the logging computer/software to move both ears to the receiving radio when the other radio is transmitting.

This view of the *obvious* approach left me with only one question: What did SO2R ops think was the value of switching both ears to the receiving radio when the other radio was transmitting? To find out, the following questions were sent via email to the 44 respondents to the survey presented in Part 1:

With regard to audio switching, do you:

Question 1—Always have the left radio in the left ear, right radio in the right ear, or,

Question 2—Left in left ear, right in right ear when both are Rx, and both ears on the S&P radio when the run radio is calling CQ, or,

Question 3—Other?

Question 4—Comments appreciated

In retrospect, this was an inelegant set of questions. Much of the useful information came in reply to Questions 3 and 4. As it turns out, choosing among the possibilities for allocating and switching the audio streams from two receivers is anything but simple.

The Data Set

There were 33 responses, 32 from the 44 operators who were sent the questions, and one that arrived unsolicited! One response was too vague and was set aside, leaving a data set of 32. Among the 32 are many frequent top-ten finishers and long-time SO2R operators.

It is important to note that unlike the data presented in Part 1, the sample size for this data set is small compared to what turned out to be a large sample space. Also, when an individual mentioned a particular practice in reply to Questions 3 or 4, it is not possible to know whether others use the same practice or simply failed to mention it.

As a result, most of these findings should be viewed as qualitative rather than statistically significant.

Results

Questions 1 and 2:

Thirty (30) of the 32 replies (94%) indicated at least some operation with LR=LE (left radio in left ear) and RR=RE, with audio either fully separated or with minor mixing (small amount of LR into RE and RR into LE). Two responses indicated both radios in both ears all the time together with "riding the AF gain(s)."

Of the 30 stations using LR=LE and RR=RE, 12 (40%) indicated they do not switch both ears to the Rx radio when the other is Tx. Sixteen (53%) indicated they do switch both ears to the Rx radio when the other is Tx at least some of the time, and two (7%) did not indicate.

Of the 30 stations using LR=LE and RR=RE, 7 (23%) specifically mentioned mixing a little of one channel into the other channel. The rest did not mention mixing.

Of the 30 stations using LR=LE and RR=RE, 11 (37%) mentioned at least occasionally shifting both ears to one radio for one or more of three reasons. Eight mentioned doing it to pull weak ones out of the noise, five mentioned doing it when run rates were so high they considered the S&P radio a distraction, and two mentioned dropping back to SO1R when fatigued or to "take a break."

Discussion

With regard to switching both ears to the Rx radio when the other is Tx, the population is about evenly split between those who do and those who don't. There were only two responses indicating non-switching because their gear didn't support it. The rest of the "non-switchers" indicated or implied they had tried it and didn't like it.

A typical comment from a non-switcher: "I tried...having the CQ radio in both ears and then the S&P radio in both ears but personally I find that very disconcerting. The whole world is jumping in and out of my head and it drives me nuts."

A typical switcher's comment: "...automatically switches the second radio when the run radio is transmitting. That's a *necessary* feature IMHO for me!" [sic]

Using the raw data, it is not possible to conclude that one method is better than the other—the population is split and this practice appears to be a matter of personal preference. As conjecture, however, effective use of switching both ears to the Rx radio when the other radio is Tx is likely a learned ability. The majority of ops who do not use the technique indicated they found it *difficult*, as opposed to *not useful*. It is possible many of the SO2R ops that do not switch both ears to the Rx radio when the other is Tx can make effective use of the technique given enough practice. The commercial SO2R boxes provide the feature as a switch-selectable option.

Whether to switch both ears to the Rx radio or not is not, however, simply a decision regarding trying to learn the technique. Responses to Questions 3 and 4 highlighted the fact that there are at least four additional considerations:

1. ***Switching vs. pots*** There are advocates of each, but I only received one strong pro-potentiometer reply. A pro-switch comment: "Some folks like a pan-pot left and right control, but I find the switchbox focuses my attention nicely." The one pro-pot comment: "I have *both* radios in *both* ears all the time. I use a variable potentiometer to control the amount of audio from the right radio and audio from the left radio, which can vary from 100% right radio to 100% left radio."

2. ***Mixing audio*** With regard to mixing some LR into RE and vice versa, I suspect many more stations do so than indicated they do—as this was not specifically asked. Proponents of mixing like the fact that mixing in a small amount of opposite-channel audio makes both audio streams appear to be coming from somewhere inside your head.

3. ***Transmit radio CW sidetone*** Most ops want it—particularly for occasional manual sending—and some indicated they want it all the time. "...It helps my

rhythm," one op said. Two ops specifically did not want it: "...the sidetone coming back from the Tx radio will be confusing. Its easier to kill the sidetone...;" and, "...no sidetones for CQing for distraction!"

4. ***QSK*** [Two responses] When operating QSK, the operators want to hear "in-between" the sending, so these stations do not switch both ears to the Rx radio when the other is Tx.

More Considerations

If the above is insufficient to get you rethinking your SO2R audio switchology, then consider:

1. ***Software vs. Hardware*** Most respondents indicated their SO2R functions were implemented in hardware. Hardware approaches include homebrew, the TTD DXD and the WXØB SO2R master. Three respondents specifically mentioned *Writelog*'s HEADPHONE LATCH + SPLIT commands, however, which provide significant operating flexibility via software when used together with the MK-1100 Multi-Keyer. *Writelog* provides software control of audio switching, including switching both ears to the Rx radio when the other radio is Tx from the F keys or keyboard, and inhibiting that switching if you are sending manually so that you can hear the sidetone.

2. ***CW vs. Phone*** This was mentioned several times without yielding any clear information - at least to me. Is there an advantage to making SO2R audio switchology different between CW and Phone? There is at least one obvious difference—manual CW sending requires hearing the sidetone. This is unnecessary for phone.

3. ***Stateside vs. DX*** One ZL mentioned he spends significant time running pile-ups of weak US signals—both ears on the run radio was a requirement. Where you are and exactly what you are trying to do does matter.

Some Interesting One-offs

"A 'code reader' remains the best utilization I've made in the shack—some way to determine the radio I no longer hear (the running rig) is 'doing the right thing' as it's transmitting while I am listening to something else."

This is the only response in which auditory monitoring of the transmit radio was replaced by visual monitoring—a clever and scientifically sound idea. This response helped shape the design of the SO2R controller I use at N4GG—it is shown in Figure 1. The center LED is keyed along with the transmitting rig, providing visual monitoring of the outgoing signal. This allows both ears to be on the Rx radio without having to hear the sidetone from the Tx radio. It is possible to read outgoing CW, even at 35 WPM, by watching the LED. Allocating tasks between auditory and visual brain functions will be discussed further in Part 3.

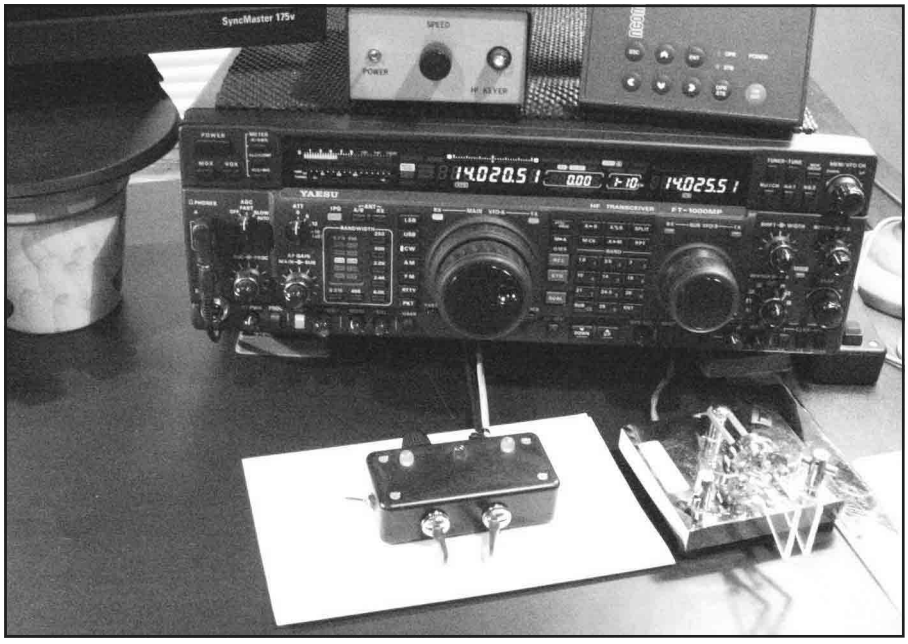


Figure 1—The home-brew SO2R audio controller at N4GG. Audio CW sidetone has been replaced by a keyed LED.

"The radio on the left is set to 'zero beat' at about 400 Hz (lower note) and the one on the right is set for about 700 Hz (higher note). I find it helpful to "stereo-ize" them in my head."

This is something I want to try.

"Ear matches radio location, left and right. God help me if I ever stack the radios vertically."

Interestingly, the operator who uses vertical stacking (see Part 1) does not find this to be a problem.

"I find that keeping the audio levels as constant as possible helps my brain function..."

This station does not switch audio when transmitting.

"Speakers, no switching" —You must be joking!

Wrap-Up

Let's return to the question in the title: Is there a best approach to SO2R audio switchology? The answer is no, there is no single best approach, and yes, there is likely a best approach *for a given individual at a given point in time* considering his/her inherent abilities, learned abilities, and operating circumstances.

With regard to inherent abilities, a perennial top-finisher said: "What works best for a given contest op is a very individual thing. Everyone's brain works a bit differently and everyone's ability to hear the frequency spectrum and distinguish audio from noise varies as well. You need to try everything and see what works best for you and makes you the most efficient."

This seems right to me. An example of a choice that may be rooted in inherent abilities is the one between using a pan-pot and using switching.

Some of our abilities, of course, change as rapidly as over the course of a contest, while others change slowly over time due to learning and conditioning.

The "best approach" to SO2R audio switchology is one that functions in accordance with one's inherent abilities, and, has sufficient flexibility to allow real-time tailoring to changes in ability and circumstances. As a minimum, this tailoring must include the ability to move to SO1R for mitigating fatigue, digging out the weak ones and maximizing run rate.

As a final consideration, stations hosting guest operators should consider providing a variety of audio switching functions from which their operators can choose.

Thanks to all who responded to the layout and the audio switching questions posted on the cq-contest reflector at **contesting.com**, and via follow-up email. It is a pleasure to note that sharing information continues to be the hallmark of top contester operators.

While Parts 1 and 2 of this article did not provide cookbook "best approaches," I hope they at least yielded up some food for thought. In the next issue of *NCJ*, Part 3 will examine how our brains handle multitasking, and speculate on how to allocate station functions to brain functions. NCJ

Voice Techniques for Contesters

Don Daso, K4ZA
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Babies can scream for what seems like hours on end, without any apparent damage. You can shout yourself hoarse during an afternoon's football game. Or find yourself without voice at the end of the CQ WW contest. Why? What has happened? The answer involves understanding proper use of your voice, compared to the *misuse* of your voice. We are speaking, of course, of habits—things that began as casual indulgences, methods of being socially acceptable, then slid into habitual behavior. So, our football fan might not be able to shout as loudly as he or she would like. Or perhaps you have saved yourself for just this contest weekend, and can't believe you can hardly speak Sunday morning, just when the bands are opening to Europe. Such examples may sound familiar. I will explain why such cases occur, and how to prevent those that relate directly to phone contest operating.

A Few Words About Technique

I've always liked the inherent value in the slogan (popular in police procedurals): "Work like you train; train like you work." Good voice technique is about giving you freedom. Freedom comes from choices and confidence: choices about what kinds of sounds to make; confidence in the knowledge that whatever sounds you choose or want to make, you'll be able to do so, without effort or strain. Tiny muscle movements create your voice. Getting the muscles of your voice in shape can give you self-confidence. What do you do when you want to get in shape? You exercise! What happens with correct exercise? Your voice works effortlessly. So, when you step up to the mike, you have no worries about your voice. Singers and performers know and practice this. Phone contesters, cramming a year of "performing" into a single weekend, can benefit as well.

Some Common Mistakes

First, we have to cultivate an awareness of our own voice - how we are using it, and how our posture may interfere with good voice use. This means more than simply examining how the articulating organs work, or the throat, or how we breathe. We have to look at these, of course, but we must also look at the "whole body function" picture. Let's start with some common mistakes and some common *misuses*:

Try to watch yourself (maybe point your video camera at yourself) the next time you're in a pileup, calling. You may find yourself stretching out with your neck and head. This is great for demonstrating the "Reach Out and Touch Someone" idea, but bad posture for your voice. Try it. You will feel the strain. It's a natural reaction, but not good for the voice. In fact, a picture of it could simply be titled: *How To Get A Sore Throat.*

Pulling your head back, instead of dropping the jaw, when taking a breath to speak. This effectively closes part of the throat. It also puts your larynx in an improper relationship with your breathing. The movement may seem small, but inevitably, you end up losing control of the soft palate and sounding overly nasal. Your jaw release is slowed down. You'll be short of breath, and, for want of a better term, you'll have a stiff tongue. Resonation and articulation suffer.

Pulling down is associated with pulling the head back. Your rib cage slumps toward your stomach; your shoulders are pulled forward, narrowing across the top of the chest. This all makes you feel low in energy - almost depressed. Breathing is overly constricted; the voice lacks adequate support. This often forces abdominal muscles to move too much, making your voice a monotone.

Pulling back in. Typically, this makes you breathe mostly in the upper chest. The relationship between vertebrae is such that the back loses much of its width at the place where your lungs are largest, making it difficult to speak long phrases. And if you get excited, under the least little bit of stress, too much adrenalin will be produced. Vocal control will almost disappear. This makes for a shrill voice.

Ways To Eliminate These Four Problems

A comfortable chair (one that fits your body size) and a boom microphone headset will do the most to guarantee proper posture during a contest. What's left, besides winning? Practice, in speaking correctly, that is.

Keep the joint of your jaw open and free at all times. Don't worry about how far apart the teeth are; just allow your jaw to move freely. Remember to think of your breath as a continuing flow from a tuned-up voice.

And keep the muscle activity in shaping consonants as light, yet as precise, as possible. This is simple. (Whether

Ergonomics

The information on posture contained in this article pertains to ergonomics—a term derived from two Greek words: *ergon*, which means work, and *nomoi*, which means natural laws. So, we are talking about human capabilities relating to work. In recent years, studies have been made to suggest postures that minimize unnecessary static work, and reduce forces acting on the body.

The guiding principles are:

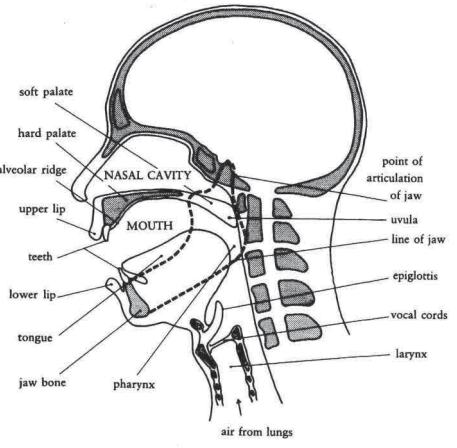
- being able to use or adopt different, but equally healthy and safe, postures;
- when force has to be exerted, the largest muscle groups should do it;
- activities should be performed with the joints near the mid-point of their range of motion (especially head, trunk, and upper limbs).

Anatomy Of Speech

A few minutes examination of the anatomy involved should convince you that the process of speaking is more complicated than you perhaps thought:

- That some practice may be in order to be a good voice op.
- That your vocal cords, mouth and throat, nose and sinuses, and above all, your breathing, combine in unique and special ways to produce sound.

One key to success is a boom mike headset, so that only a conversational tone is needed as you speak.



Anatomy of speech organs.

they've learned it through research, or through practice, you can sometimes hear this in the voice of the seasoned Caribbean-contester's exchange. He's not fully articulating the FIVE-NINE thousands of times - those are all rough-on-the-voice consonants— but rolling out a smoother and faster FIFE-NI litany instead.) Keep your neck loose and free, use a good chair and mike, and you eliminate most of the potential for voice strain while contesting.

The Mechanics

You can view the lungs, the throat, and the mouth and nose as a system of tubes and valves that simply regulate airflow. When speaking, you actually breathe out and direct air through your throat, mouth or nose, thereby creating different sounds. Such sounds largely depend on:

A. The vocal cords,
B. For vowels, the shape of the mouth (determined by the position of the tongue), and
C. For consonants, the obstruction of airflow (by valves, tongue or lips).

For instance, say "*t-d-t-d-t-d"* over and over, and you'll notice that your mouth is doing exactly the same thing to produce the *t* and the *d*. The only difference is that you switch the vocal cords on and off.

Your voice is produced by vibration of your vocal folds. Put simply, the vocal folds are two bands of smooth tissue that lie opposite each other. They are located in the larynx, commonly called the voice box. The larynx is positioned between the base of the tongue and the top of the trachea (windpipe), or the passageway to the lungs.

At rest, the vocal folds are open to allow an individual to breathe. To produce sound, our brain precisely coordinates a series of events. First, the folds come together in a firm but relaxed way. Once closed, air from the lungs then passes through them, causing vibration, thus making sound. The sound from this vibration then travels through the throat, nose and mouth (resonating cavities). The size and shape of these cavities, along with the size and shape of the vocal folds, helps determine our vocal quality.

Variety within an individual's voice is the result of lengthening or shortening and tensing or relaxing the vocal folds. Moving the cartilages, or soft, flexible bone-like tissues to which the folds are attached, makes these adjustments possible. For example, shortening and relaxing the vocal folds makes a deep voice; lengthening and tensing them produces a high-pitched voice.

Posture, practice and other mitigating circumstances (not all of which we can control) can all affect that vocal quality. For the contest operator, the best options are proper practice, proper procedures and the best possible environment.

Some Thoughts On Voice Maintenance

Improper care usually results from ignorance. Remembering our crying baby, we might assume the voice to be tireless. And the stamina IS amazing, considering the abuse it can suffer. You speak from when you get out of bed until day's end, regardless of weather, in smoke-filled rooms, in cold or dry rooms, sometimes with a cold or allergies, and so on. The idea of maintenance may

The Operating Chair

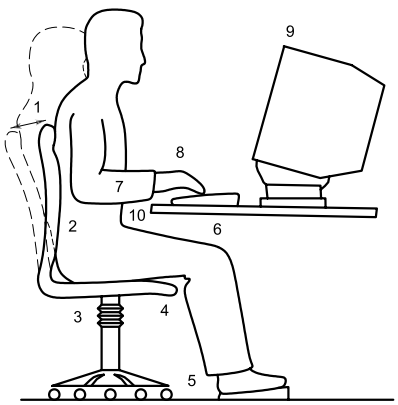
A well-designed chair for you to sit in is one of the most important parts of a good contest station. It will favorably affect posture, circulation, as well as the amount of effort required to maintain a good comfort level, and the amount of pressure on the spine. Comfort *will* affect your rate, regardless of propagation.

The following recommendations should be followed:

• Your seat should adapt to you, not vice versa.
• Chairs should be stable and fully and easily adjustable while you are seated.
• Your chair's seat pan and backrests should be upholstered and covered in a material that absorbs perspiration.
• Your seat pan height should be adjustable and should transfer your weight through the buttocks, not the thighs.
• Your backrest should adjust up and down, as well as backward and forward, or flex with your body's movement for good lumbar support. A forward tilt of the seat may relieve stress in some applications (allowing the backrest to follow you movements in performing certain tasks).
• You should have wheels or casters on your chair (hard casters for soft floors and soft casters for hard floors). Your chair should then preferably have five legs. This offers improved stability and reduces the risk of you tipping over.
• The front of your seat should be of a "waterfall" design in order to provide sufficient clearance for your thighs and to prevent reducing your circulation.
• Your seat should swivel, especially since you'll probably be making many lateral movements.
• Staying in the same position for long periods causes fatigue. Knowing this, and being able to changes chairs or move around comfortably, will help lessen such fatigue.
You should be able to adjust the height of the seat—you didn't think secretaries put typewriters and workstations at lowers heights just for looks, did you?
• If seat height cannot be adjusted, you should have a footrest, which will help relieve pressure under the thigh. This should be angled and covered with a non-slip surface to provide comfortable support for your feet. (Perfect for incorporating a footswitch, too!)
• Set up your station to avoid unnatural postures. You shouldn't have to lean forward or backward unnecessarily to operate any gear or view any screen.
• Your station gear should be designed so that all gear or equipment requiring frequent access or adjustment is within acceptable reach distances.

To aid in your decision, spend a few minutes answering the questions about your chair use (designed to help you evaluate your needs) on the Web at **ergo.human.cornell.edu/Pub/AHquest/seatingeval.PDF**

Remember, no one chair will fit or work for all persons, regardless of what salesmen may tell you.



(1) Seat Back Adjustability
(2) Good Lumbar Support
(3) Seat Height Adjustability
(4) No Excess Pressure on Underside of Thighs and Backs of Knees
(5) Foot Support if Needed
(6) Space for Postural Change, No Obstacles Under Desk
(7) Forearms Approximately Horizontal
(8) Minimal Extension, Flexion or Deviation of Wrists
(9) Screen Height and Angle Should Allow Comfortable Head Position
(10) Space in Front of Keyboard to Support Hands/Wrists During Pauses in Keying

Check your posture to make sure it is right.

Dayton Hamvention Contest Forum Report

Doug Grant, K1DG

The 2004 Hamvention Contest Forum was held in a hot, crowded room at the Hara Arena. Instead of the usual curtained-off Room 4 with seating for 350-400 people, we were shoehorned into a small room with seating for only about 120. With every seat full, and many sitting on the floor, we needed a good program to prevent a riot.

And we had a *great* program.

First up was a preview of a new reality TV series, "The Contesting Apprentice." This was based on "The Apprentice" featuring Donald ("The Donald") Trump and his would-be employees, and starred K3LR in the role of "The Tim." Four contestants were chosen to compete for a special prize, with The Tim's special assistants K2RED and KL7RA observing and evaluating their performance on a variety of tasks. On Friday morning the contestants had been organized into two teams for the first task—obtaining the lowest-possible quotes for a WRTC-style station from dealers at the Hamvention. The K9PG/N5RZ team was judged to have done a better job than K5NZ and WZ3AR. After careful consideration of the performance of each team member, Tim "fired" WZ3AR.

The remaining three players were each given 25 PL-259 coax connectors to sell. Proceeds from the sale of the connectors would go to the W4AN Memorial Fund to benefit Bill Fisher's children, and whoever sold the connectors for the most money would win the game. Later in the day, at the contest dinner, the results showed that K5NZ and N5RZ had both sold their connectors for over $100, but the big winner was K9PG, who sold his first 24 connectors for over $500! Confident that he had won, he offered the final PL-259 for auction at the Contest Dinner, where it sold for $100. Congratulations to Paul on his victory, and to all who contributed to the fund-raising activity for W4AN's kids.

Next was a slide show by Jeff Briggs, K1ZM, telling the story of the design and construction of the VY2ZM contest station on Prince Edward Island. Amazing antennas, amazing location and amazing winter snowdrifts! Jeff noted that despite the harsh winters, the ocean is a pleasant 70 degrees in the summer, and great for swimming. And the station is enormously loud on the low bands into Europe, as evidenced by some recordings of 160-meter signals that Jeff played.

K3LR with special assistants K2RED and KL7RA previewing the new reality TV series The Contest Apprentice.

David Kopacz, KY1V/VP5X, and Daniel Bradke, W2AU, delivered a joint presentation. David founded the Young Ham Contest Program, designed to get more young hams into contesting. It is an essay contest that offers an all-expenses-paid trip to VP5X for the CQWW. Daniel, age 14, was the first winner of the program and gave an outstanding presentation on his trip. I am sure we will hear more from this fellow in years to come. David was also honored as Ham of the Year by the Hamvention for this project.

Rob Sherwood, NC0B, was up next with a discussion of the requirements for radios for contesting. The highlight of his talk was a comparison of the performance of a wide range of receivers, old and new. It showed that the Ten-Tec Orion lives up to its claim of having the best receiver performance for close-spaced signals, as experienced in a contest environment. Full details are now posted on Rob's Web site **www.sherweng.com**.

NCJ Editor Carl Luetzelschwab, K9LA, gave a quick update on the past, present, and future of the *NCJ*. He acknowledged the previous editors, some of whom had served multiple times, and commented on the need for more article volunteers, especially for technical articles.

The final presentation of the 2004 Contest Forum was a panel discussion on the past 25 years of contesting. The panel consisted of the winners of the major contests of 1979: ARRL DX CW winner K1GQ; ARRL SS winner (both modes) K2TR (who operated from KP2A on CW and KP4Q—now NP4A—on SSB); ARRL SS CW #2 K7GM; CQWW SSB World Multi-multi winner N4PN of the VP2KC team; USA CQWW Multi-single winner K5RC, represented by K5KG; and CQWW SSB World-high single-op N6AA (operator of 9Y4VT). ARRL DX SSB winner K1PR and CQWW SSB USA winner N7DD were unable to be present, but submitted comments by e-mail.

It was an honor to moderate this panel, with many of the heroes of my early years of contesting present.

These guys, most of whom are still active to some degree, had numerous comments on what has allowed scores to skyrocket in the past 25 years. Looking back on the 1979 contest season, 2000 QSOs would win a DX contest, and 325 would win the Sprint. Radios have gotten better, antennas have gotten better, operating is more efficient with computer logging/duping, and there is simply more activity in most of the world. Packet was discussed, and K1GQ noted that he ran the second-ever packet node (which was connected to #1—AK1A).

K2TR observed that the barriers to entry and developing a good station are actually lower now. Inflation-adjusted radio prices are lower, and even relatively inexperienced individuals can use software tools to design the "right" antenna for their location, while in 1979 it took years of experimenting to "get it right." N4PN, reminiscing about the massive VP2KC operation, which spent $350,000 1979 dollars (equivalent to over $800k today) to win a $35 plaque, including a huge long-distance phone bill for calling up rare multipliers to get them on the air and in the log.

K5KG noted that in 1979 multiops were literally smoke-filled rooms, while today almost none of the ops at a multiop smoke. K1GQ offered his opinion that contesting is really about the people who do it, and he has always been impressed by the technical knowledge and willingness to help that characterizes contesters. N6AA read some of the notes from his 1979 logs, including some outrageous phonetics used by some DX stations. All of the panelists agreed with Dick that practices like excessive power, packet cheating, etc, are in the small minority, with cheaters quickly discovered and discredited.

Looking forward, the panel concluded that the East Coast was destined to continue to dominate DX contests, and the key to winning the Sweepstakes will continue to be a ticket to KP2 or KP4. K2TR's parting comment was that contesters are probably the best-equipped to fight BPL, since a multi-multi station with kilowatts and beams would likely cause enough degradation to BPL performance to result in customers turning to other means of Internet access, such as cable, DSL, satellite or broadband wireless in the UHF spectrum. And it was also noted that in 1979 that the only BPL we knew about was the Brass Pounder's League. NCJ

The 12th Annual Dayton Contest Dinner

By Tim Duffy, K3LR
www.k3lr.com

Wow, 12 years and going strong! The North Coast Contesters hosted contesters from all over the world in Dayton, Ohio this past May 15. The Contest Super Suite and the Dayton Contest Dinner are the best way to spend a weekend talking about our favorite hobby, radio contesting. This year almost 325 contesters enjoyed a prime rib dinner together at the Crowne Plaza Hotel in downtown Dayton. Every year this dinner gets bigger and better.

The Dayton Contest dinner is home to the yearly induction of fellow contesters into the CQ Contest Hall of Fame. During the past years, over 40 contesters have been inducted. We were honored to have Trey, N5KO, and Steve, N8BJQ, join the CQ Contest Hall of Fame this year. The Contest Hall of Fame is the top honor a contester can ever receive. To be recognized by your peers as standing apart from the rest as an ambassador to our sport is the epitome of radio contesting. The award does not come about by winning contests, it happens because the CQ Hall of Fame contesters have contributed to our hobby in many varied ways. The first member into the hall was Buzz Reeves, K2GL (SK). Buzz received his award at his own restaurant during a birthday party where I was honored to be present along with many other K2GL operators.

Our dinner speaker this year was Atilano Oms, PY5EG. Oms discussed his outline for hosting WRTC 2006 in Brazil. It is clear that he has a personal mission to make sure everything goes smoothly. He also encouraged the dinner attendees to tell the WRTC committee what changes should be made to the rules. He wants this to be the best WRTC ever.

Bob Cox, K3EST, who is the director of the CQ WorldWide Contest, chairman of the CQ Contest Hall of fame and a member of the Hall himself, gave out the two Hall of Fame awards during the dinner.

Trey, N5KO/HC8N, is a world class contester, creator of the "CQ-Contest and 3830" Internet reflectors, cofounder of contesting.com and eHam.net Web sites, former editor of the *National Contest Journal* and behind-the-scenes developer of computerized log standards. PY5EG and XE1KK spoke on behalf of Trey.

Steve, N8BJQ, was a longtime director of the CQ World Wide WPX contests and an early advocate of computerized log checking. K3EST and K3LR spoke on behalf of Steve.

Ellen, W1YL, remembering her son K4OJ (SK).

Steve, N8BJQ, receiving his CQ Contest Hall of Fame award from Bob, K3EST.

Trey, N5KO, receiving his CQ Contest Hall of Fame award from Bob, K3EST.

We also had the last "Board Room" session of the Contest Apprentice where Paul, K9PG, was hired. Paul managed to outpace his competitors in the task of selling PL-259s during Saturday at the hamfest. All of the proceeds (almost $900) went to the W4AN memorial fund. Thanks to the Contest Apprentice entrants: WZ3AR, K5NZ, N5RZ and K9PG for playing along and special thanks to Gail, K2RED, and Rich, KL7RA, for helping me with the tasks.

The prize list was extensive this year. Almost 90 prizes were given to those in attendance. These prizes came from companies who consider contesters to be a substantial part of their business. I'd like to thank the following companies who donated great prizes: Force12; American Radio Relay League; Array Solutions; KØXG Antenna Rotation Equipment; CAL-AV Labs; *ACE-HF*; TIC Ring; Champion Radio Products; *WriteLog*; *CQ Magazine*; AN Wireless Tower Company; AY Technologies; Comtek Systems; W1WEF CW Interfaces; W4MPY QSL Man; *The DX Magazine*; Radio Bookstore; Radio Ware; Top Ten Devices; DX Engineering; Alfa Spid; ZS4TX; YagiStress-K7NV; W3NQN Filters; OptiBeam; *National Contest Journal*; Prosistel; SlippNott; ICE; K5KA's FEL Equipment and RA Cheetos.

North Coast Contesters, Frankford Radio Club, The Mad River Radio Club and DX Engineering all sponsored the "Contest Super Suite," now in its 16th year at Dayton. K1TO, K8AZ, K8CC and K3LR sponsored the Pizza Party at midnight on Thursday night honoring Bill Fisher, W4AN, where 25 pizzas were enjoyed. Members of the Yankee Clipper Contest Club hosted the Pizza Party in the super suite at midnight on Friday night where 30 pizzas went down fast. The Florida Contest Group honored K4OJ during the midnight Saturday night Pizza Party that they sponsored, where 25 pizzas were consumed in 18 minutes!

Thanks to Jim Miller, K4SQR, for helping me coordinate the dinner. Also thanks to Tom Roscoe, K8CX, for all the pictures.

Preparations are already underway for the 13th Annual Dayton Contest Dinner.

Make your plans now to attend Dayton 2005 and enjoy the company of some of your best friends. Watch for announcements in this magazine, on Web sites, in the ARRL *Contest Rate Sheet*, and on the **cq-contest@contesting.com** reflector. Suggestions are always welcome. Send them to **k3lr@k3lr.com**. NCJ

N3FJP Contesting Software—Comments from K3MD

John W. Thompson, MD, K3MD
TJwt105@aol.com

I recently stumbled over the available N3FJP contesting software while surfing the Web. There are many separate programs available (*43 at the time of this article—Ed*) for a wide variety of contests, including the biggies: CQWW, ARRL DX, FD, Nov. SS, WPX, CQ and ARRL 160 Meters, down to some obscure contests such as FISTS sprints. It is very interesting that in the programs available for the state QSO parties, it is possible to log the county worked by using a pull-down menu such as would be used in ordering something from a website. This feature is appealing.

A general logging program called *Amateur Contact Log* (ACLog) is also available. It is roughly equivalent to *LogWindow*, but has a greater degree of flexibility in arranging what information you wish to have stored. All contests have import / export availability using .adi format, which makes interchangeability with existing logging programs very good. All programs have the availability of easily written Cabrillo output.

The programs are available in a large variety of methods. You can download a single program, pay a very small registration fee using PayPal, then use the program. The author is *very* attentive, and replies to e-mails and orders just before contests. All the programs are free to try and can be downloaded from **www.n3fjp.com**.

The cost of the software package, which includes all Amateur Radio software (as well as any programs added to the package in the future), is either $39 downloaded from the website or $49 on CD (shipping included). Upgrades to any existing programs are free to registered users.

The programs work on *Windows*-based systems only: *Windows 95, 98, 2000, ME, XP* and *NT*. It is of very great interest to me that these programs work with an LPT keying output for CW with *Windows XP*. This is a significant advantage for users of new laptop computers that don't include comm (serial) ports. Many have attempted to solve this (unsuccessfully) with a USB port to Comm port converter and have been frustrated in the process. Trying to get the *Writelog* program to work satisfactorily on LPT CW output with the available add-on programs is difficult and this may be a viable alternative. I really am not certain why they decided to eliminate a conventional Com port on the newer laptops, but they did.

Interfacing the N3FJP programs with the existing popular rigs is extremely easy, and the interfacing seems to work flawlessly. The same is true for Internet packet. I did not check VHF packet, as I live too far out in the country to have good access to VHF packet.

A band map type display is available from the band you are on to an all-band type of display. This utilizes the feature that you see only the prefix of call-outs. To see the entire call, you place your mouse over the call-out. Ratemeter and QSO/hr graphs are available.

Use of the programs is largely intuitive. Documentation is a little sketchy, but made up for by the extremely cooperative nature of the author at **snkdavis@aol.com**.

I have been using *ACLog* (the main logging program) for three months, and find that I like it better than *LogWindow*. It is easier to use, it has a good search function, and it has an unbelievably fast import function from .adi logs. It has a good address lookup function from the popular disks or from a US/VE database maintained by N3FJP personally and available *free* via the Internet.

The strengths of the program packages are as follows:

- Many obscure contests that are not covered by other vendors are covered with N3FJP's software.
- The programs are very intuitive and easy to use and therefore good for the beginner.
- The author provides very competent and rapid technical support.
- The software is available at low cost.

The weakness of the program package is that it does not include the provision to utilize the K1EA based databases in the super-check-partial function. I find this feature to be an integral strength of the K1EA, N1MM, and *WriteLog* packages that is wanting on this set of programs. Although N3FJP says he has not received any other complaints about the lack of this feature, I think it needs to be included in any contest logging software

An Open Letter: The Ethics of Contesting

Dr Seppo Sisatto, OH1VR/AE6PP

Contesting today is serious business. Many of us are investing substantial funds in building big stations with huge antennas, SO2R systems, etc. Some of us are travelling to exotic islands or countries to experience great pileups. Our goal is to *win*.

My first question is: Is the winner today always a real winner? Or is he or she someone who is using unfair methods and winning because of those methods?

My second question is: Where are our ethical rules? Should the IARU work to establish a written code of contest ethics? The ham spirit is an essential part of our ethics, but when was the last time you came away with a feeling of ham spirit in a contest? Maybe this was in the '50s?

My third question is: How do we deal with those who are not respecting the rules? Some are cheating year after year.

We cannot bypass the question of contest ethics any more. To avoid misunderstandings, I would like to emphasize the dilemma of ethics. I know such discussions can be uncomfortable, but something is wrong when we avoid the task altogether. Now is the time to do something. After all, any discussion is worthless without action as a result.

Here is a brief list of questionable contest tactics:

- Offering incentives such as a T-shirt, a bottle of wine, a special QSL, etc., to work a particular station on all available bands in the contest. I prefer to label this phenomena "contest corruption."
- The use of telephones for activating rare multipliers. This is a common part of today's contesting. Those who are living in exotic places know these callers.
- Organized cluster spotting. You can use simple methods in your research if you want to probe this dark area of contesting. Examining the relationships between various "friends" will open your eyes. The days of primitive self-spotting are almost history. There are more sophisticated methods today in use, as we know. One solution could be reprogramming clusters. As a serious participant of the contest, you could block your call from the cluster beforehand. There could even be a list of these blocked stations published on clusters before some contests. If you have not blocked your call, you cannot win. That's certainly a tough stance, but from my point of view it could be a fair-play practice.
- Intrusion on 40-meter CW. The narrow 40-meter phone band is a big problem in Region 1 during contests. Some stations use the CW band and create ill will among CW operators.
- Illegal output power. There are stations using as much as 10 kW output. If you have, let's say, a half of dozen of those super-high-power stations on the band, your operation with legal power is extremely difficult. Why do we allow this to happen?
- Transmitting a signal in two to three different directions with huge beams, but listening only in one direction. Of course, this ethically challenged operator usually has a high-power linear amplifier for each direction. This technique will guarantee that fewer stations will be able to use the bands. Is this really an acceptable practice?
- Contest log cooking—rewriting the log after the contest to screen for errors.
- "Advance promotion" where an announcement is sent several weeks in advance on the pretext that the group or individual is testing a new contest location. It's a clever way to pique interest for your own operation.

Too much power, organized spotting, and contest corruption will kill the fun of serious contesting if we let this situation continue. We must do something to root out these cheaters. Of course, it's easy to declare that the goal is to root out all unethical practices, but this is almost impossible to do in real life. Still, it is worth discussing and trying.

When we submit our logs, we usually sign the following declaration:

"I have observed all competition rules as well as all regulations established for Amateur Radio in my country. My report is correct and true to the best of my knowledge. I agree to be bound by the decisions of the Awards Committee."

This declaration is not a joke. It is a more serious matter than contesting itself. If we have done everything possible to compete by the rules, and have employed good ethics along the way, we can be proud to sign this declaration. It says something about our moral values.

How do you feel after winning a contest with unfair methods? I would like to know the answer to this. Are you proud of your achievement?

Let's continue discussing contesting ethics. I would love to hear from you. I can be reached at **seppo.sisatto@uta.fi**.

NCJ

VHF-UHF Contesting!

Jon K. Jones, NØJK
n0jk@hotmail.com

More on The Moxon 6 Meter Antenna

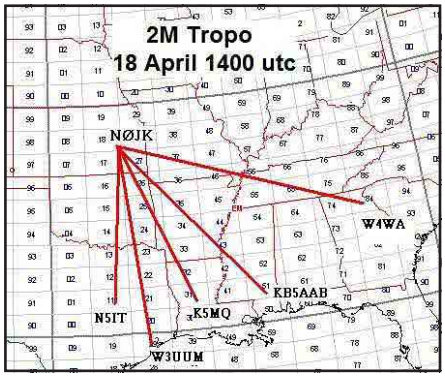
The Moxon antenna, which was mentioned in the May/June 2004 *NCJ* in this column, generated a surprising amount of reader interest and feedback. Several readers had comments about the antenna pattern and stacking of the Moxon. From the May/June 2004 column:

"*At the risk of helping my competition in the single op portable class, here is a suggestion for a big QRP Portable signal on 6 meters. Clarke says one can stack two Moxons at 10 and 20 feet. The gain will approach a 5 element Yagi at 20 feet, with a much broader pattern in the H plane.*"

A 6-meter Moxon by itself at 25 feet above ground has a forward gain of 11.4 dBi with a broad horizontal beam pattern. The – 3dB points are at 78 degrees. The front to back ratio is about 30 dB (from L. B. Cebik, W4RNL).

Stacking two Moxons at 15 and 25 feet will compress the vertical pattern of the antenna while essentially preserving the horizontal pattern. I estimate about 2 dB of gain is realized by stacking two of them for a total gain of around 13.5 dBi with the top antenna at 25 feet (which is do-able by a portable station). The stacked Moxons gain actually compares favorably with a *7 element Yagi on a 25-foot long boom!* The 7 element Yagi has a narrower horizontal pattern of around 45 degrees. This means you will need to turn the Yagi more frequently during an opening to work stations from different directions. The wide forward pattern of the Moxon lets you point and set the antenna. You can leave it alone and concentrate on working the radio. For those using an "armstrong" rotator (moving the antenna by hand), this is a real advantage. What a great 6-meter antenna system for the portable operator!

There is a factor to consider with the Moxon, and that is the high front to back ratio. This is one reason the antenna has such high gain for the size. Usually a high "front to back" is considered a plus as it reduces QRM. But if you are in the mid section of the country with 6 meters open east and west, you will find the Moxon will need to be turned frequently to hear callers off the back of the antenna. A possible solution to this is to put up one Moxon facing east and another to the west, and switch between the two. After studying the Moxon more, I am considering trying one in the June 2004 VHF QSO Party. In the April 2004 issue of *QST* there is a great article by Allen Baker, KG4JJH, about building your own Moxon ("A 6 Meter Moxon Antenna," pp. 65). Allen



notes at 15 feet above ground his horizontal Moxon has a peak gain of 11.06 dBi at 18 degrees elevation.

Single Hop E_s Distance Versus Antenna Radiation Angle

Another reader had a question regarding the graph of E-layer single hop distance. The label was left off the Y-axis—it is the elevation in degrees of the signal leaving the antenna. At 5 degrees elevation, for example, a single E_s hop will be about 1000 miles. The maximum distance covered by a single E_s hop is about 1300 miles at zero degrees elevation. This is for the "classic" single-cloud model of E_s propagation. In the real world, there are cloud-to-cloud E_s, tilted E_s clouds, and other phenomena that occur. But the point of the diagram that most E_s hops on 6 meters involve a radiation angle of less than 15 degrees (and much is at 5 degrees or less) remains valid. Thus the recommendation of some old timers that "6 meter short skip" is best worked with a "low antenna" is not correct. This is because the E_s clouds occur at a lower altitude than the F layer.

Just moving your 6-meter antenna from 10 to 20 or 25 feet high will make a significant improvement in your signal for E_s and ground wave contacts. For a portable operator, being on a high hill or near a cliff with a sharp drop off can put your antenna's effective height at many wavelengths on 6 and 2 meters. For tropo work on 6 and 2 meters, and even on the UHF and microwave bands, you will want to maximize your signal right at the horizon.

The 2004 Summer E_s Season—A Slow Start

As I write this column, the summer 2004 E_s season is underway. It has been slow to get started. There was almost no E_s propagation anywhere in the 2004 6 Meter Spring Sprint held on May 8 and 9. In 2003 6 Meters was open several hours during the sprint. The fall 2003 6-meter sprint had far better conditions. Pat Dyer, WA5IYX, who is a longtime observer of VHF propagation from San Antonio, Texas, notes that as of May 19, 2004 there were only 75 minutes of "E_s events for 88 – 108 MHz" since May 1. In 2003 there were 580 minutes of E_s events from May 1 to May 19. While E_s events in May do not directly predict what will happen in June, in 2002 there was only 120 minutes of E_s events for the whole month of May. As many of you will recall, E_s in the June 2002 VHF QSO Party was dismal. So, are we in for a "tough" contest this June?

Despite the slow E_s season, there have been several days of good openings on 6 meters. May 11 had the band open in Kansas most of the evening from Michigan to VE5 on out to Washington State. Several transatlantic 6 meter openings between the eastern states and Europe/Africa occurred in mid May, a very unusual occurrence. On May 14, for example, W1s, W2s and W3s worked Morocco on 6 meters. A number of good double-hop E_s openings have occurred between New England and the Pacific Northwest. Gene, W3ZZ, commented that the 2004 E_s season has favored more northerly stations at higher latitudes. Even tonight, as I write this column, VE6 is working WI and MN stations on 6 meter, continuing the "northern theme for E_s." This could bode well for 6-meter E_s openings to Europe and Japan from North America in the contest. There is always the possibility of a great contest weekend E_s opening, even during a down year. In 1992, WA5IYX noted a slow overall summer season, but that year the June VHF QSO Party had one of the best contest E_s openings ever. In 1993 there were only 25 minutes of observed E_s events in May at Pat's location, but the June 1993 VHF QSO Party had outstanding E_s both days of the contest. However, in 1997, as in 2002, a "slow May" predicted a slow VHF QSO Party on 6 Meters. So … a poor May may or may not mean a slow June VHF QSO Party for 6 Meter enthusiasts.

For more on Pat WA5IYX's E_s efforts, see his Web page at **home.swbell.net/pjdyer/.**

But Tropo Has Been Great This Spring…

There have been a number of good

tropo openings for the VHF/UHF operators this spring. April 16-18 and May 5-6, for example, had strong tropo openings from the Midwest to the Gulf Coast and southeast states. On April 18, stations in south Texas worked to Indiana, Oklahoma worked to Ohio and Kansas worked to Georgia on 144, 222 and 432 MHz. These two openings were associated with "wave cyclone" weather systems. There have been outstanding widespread tropo openings during past June VHF QSO Parties. Nineteen eighty-seven and 1998 are two that come to mind. In 1987, stations in the Midwest worked all the way to W3 on 1296 MHz. W2DRZ on 222 MHz, and W2SZ/1 was heard on 432 MHz by WBØDRL in central Kansas Sunday morning of the contest.

A widespread tropo opening often has a bigger impact on VHF contest scores than 6-meter openings. Tropo propagates VHF/UHF and microwave signals over long distances. With the current scoring system rewarding UHF and microwave QSOs, a big tropo opening can really boost scores for contest stations equipped on the UHF and microwave bands. In 1998, there were a series of good tropo openings in April and May. The weather system responsible for them continued on into June with tropo for the contest. Thus, a good spring tropo season predicted tropo for the June VHF contest. Tropo can appear out of nowhere, too, as excited contest operators found in the July 2003 CQ VHF Contest. A review and analysis of the July 2003 CQ WW VHF Contest tropo opening is in the November/December 2003 *NCJ* starting on page 28.

The 2004 CQ WW VHF Contest will be held July 17-18. John Lindholm, W1XX, announced that the contest will start a new plaque program. He says, "These are really neat 9 × 12 inch walnut 2-color-on-polished-brass plaques." Too bad they didn't offer these for the 2003 contest! Those interested in sponsoring a plaque or for more information about the CQ VHF Contest see **www.cq-amateur-radio.com/**.

NCJ

Contest Calendar

Compiled by Bruce Horn, WA7BNM

Here's the list of major contests of possible interest to North American contesters to help you plan your contesting activity through October 2004. The Web version of this calendar is updated more frequently and lists contests for the next 12 months. It can be found at: **www.hornucopia.com/contestcal/.**

As usual, please notify me of any corrections or additions to this calendar. I can be contacted at my callbook address or via e-mail at: **bhorn@hornucopia.com**. Good luck and have fun!

July 2004

RAC Canada Day Contest	0000Z-2359Z, Jul 1
Venezuelan Ind. Day Contest, SSB/CW	0000Z, Jul 3 to 2400Z, Jul 4
DL-DX RTTY Contest	1100Z, Jul 3 to 1059Z, Jul 4
Original QRP Contest	1500Z, Jul 3 to 1500Z, Jul 4
DARC 10-Meter Digital Contest	1100Z-1700Z, Jul 4
MI QRP July 4th CW Sprint	2300Z, Jul 4 to 0300Z, Jul 5
ARS Spartan Sprint	0100Z-0300Z, Jul 6
IARU HF World Championship	1200Z, Jul 10 to 1200Z, Jul 11
UK DX Contest, RTTY	1200Z, Jul 10 to 1200Z, Jul 11
FISTS Summer Sprint	1700Z-2100Z, Jul 10
ARCI Summer Homebrew Sprint	2000Z-2400Z, Jul 11
Mid-Summer Six Club Contest	2300Z, Jul 16 to 0300Z, Jul 18
North American QSO Party, RTTY	1800Z, Jul 17 to 0600Z, Jul 18
CQ Worldwide VHF Contest	1800Z, Jul 17 to 2100Z, Jul 18
Russian RTTY WW Contest	0000Z, Jul 24 to 2400Z, Jul 25
RSGB IOTA Contest	1200Z, Jul 24 to 1200Z, Jul 25

August 2004

SARL HF Phone Contest	1230Z-1630Z, Aug 1
ARS Spartan Sprint	0100Z-0300Z, Aug 3
TARA Grid Dip Contest	0000Z-2400Z, Aug 7
10-10 Int. Summer Contest, SSB	0001Z, Aug 7 to 2359Z, Aug 8
European HF Championship	1200Z-2359Z, Aug 7
North American QSO Party, CW	1800Z, Aug 7 to 0600Z, Aug 8
ARRL UHF Contest	1800Z, Aug 7 to 1800Z, Aug 8
WAE DX Contest, CW	0000Z, Aug 14 to 2359Z, Aug 15
Maryland-DC QSO Party	1600Z, Aug 14 to 0400Z, Aug 15 and 1600Z-2359Z, Aug 15
SARTG WW RTTY Contest	0000Z-0800Z, Aug 21 and 1600Z-2400Z, Aug 21 and 0800Z-1600Z, Aug 22
ARRL 10 GHz and Up Contest	0600 local – 2400 local, Aug 21 and 0600 local – 2400 local, Aug 22
Keyman's Club of Japan Contest	1200Z, Aug 21 to 1200Z, Aug 22
SEANET Contest	1200Z, Aug 21 to 1200Z, Aug 22
North American QSO Party, SSB	1800Z, Aug 21 to 0600Z, Aug 22
New Jersey QSO Party	2000Z, Aug 21 to 0700Z, Aug 22 and 1300Z, Aug 22 to 0200Z, Aug 23
ALARA Contest	0600Z, Aug 28 to 1159Z, Aug 29
TOEC WW Grid Contest, CW	1200Z, Aug 28 to 1200Z, Aug 29
YO DX HF Contest	1200Z, Aug 28 to 1200Z, Aug 29
SCC RTTY Championship	1200Z, Aug 28 to 1200Z, Aug 29
Ohio QSO Party	1600Z, Aug 28 to 0400Z, Aug 29
SARL HF CW Contest	1230Z-1630Z, Aug 29

September 2004

All Asian DX Contest, Phone	0000Z, Sep 4 to 2400Z, Sep 5
AGCW Straight Key Party	1300Z-1600Z, Sep 4
DARC 10-Meter Digital Contest	1100Z-1700Z, Sep 5
MI-QRP Labor Day CW Sprint	2300Z, Sep 6 to 0300Z, Sep 7
ARS Spartan Sprint	0100Z-0300Z, Sep 7
YLRL Howdy Days	1400Z, Sep 8 to 0200Z, Sep 10
WAE DX Contest, SSB	0000Z, Sep 11 to 2359Z, Sep 12
CIS DX Contest, RTTY	1200Z, Sep 11 to 1200Z, Sep 12
ARRL September VHF QSO Party	1800Z, Sep 11 to 0300Z, Sep 13
North American Sprint, CW	0000Z-0400Z, Sep 12
Tennessee QSO Party	1800Z, Sep 12 to 0100Z, Sep 13
ARCI End of Summer PSK31 Sprint	2000Z-2400Z, Sep 12
ARRL 10 GHz and Up Contest	0600 local – 2400 local, Sep 18 and 0600 local – 2400 local, Sep 19
Scandinavian Activity Contest, CW	1200Z, Sep 18 to 1200Z, Sep 19
QRP Afield	1500Z, Sep 18 to 0300Z, Sep 19
Washington State Salmon Run	1600Z, Sep 18 to 0700Z, Sep 19 and 1600Z-2400Z, Sep 19
QCWA QSO Party	1800Z, Sep 18 to 1800Z, Sep 19
North American Sprint, SSB	0000Z-0400Z, Sep 19
CQ Worldwide DX Contest, RTTY	0000Z, Sep 25 to 2400Z, Sep 26
Scandinavian Activity Contest, SSB	1200Z, Sep 25 to 1200Z, Sep 26
Texas QSO Party	1400Z, Sep 25 to 0200Z, Sep 26 and 1400Z-2000Z, Sep 26
Alabama QSO Party	1800Z-2400Z, Sep 25
Fall QRP Homebrewer Sprint	0000Z-0400Z, Sep 27

October 2004

TARA Rumble Contest	0000Z-2400Z, Oct 2
Oceania DX Contest, Phone	0800Z, Oct 2 to 0800Z, Oct 3
EU Autumn Sprint, SSB	1500Z-1859Z, Oct 2
California QSO Party	1600Z, Oct 2 to 2200Z, Oct 3
UBA ON Contest, SSB	0600Z-1000Z, Oct 3
RSGB 21/28 MHz Contest, SSB	0700Z-1900Z, Oct 3
ARS Spartan Sprint	0100Z-0300Z, Oct 5
YLRL Anniversary Party, CW	1400Z, Oct 6 to 0200Z, Oct 8
Makrothen RTTY Contest	0000Z-0800Z, Oct 9 and 1600Z-2400Z, Oct 9 and 0800Z-1600Z, Oct 10
Oceania DX Contest, CW	0800Z, Oct 9 to 0800Z, Oct 10
EU Autumn Sprint, CW	1500Z-1859Z, Oct 9
Pennsylvania QSO Party	1600Z, Oct 9 to 0500Z, Oct 10 and 1300Z-2200Z, Oct 10
FISTS Fall Sprint	1700Z-2100Z, Oct 9
North American Sprint, RTTY	0000Z-0400Z, Oct 10
10-10 Int. 10-10 Sprint	0001Z-2359Z, Oct 10
UBA ON Contest, CW	0600Z-1000Z, Oct 10
YLRL Anniversary Contest, SSB	1400Z, Oct 13 to 0200Z, Oct 15
JARTS WW RTTY Contest	0000Z, Oct 16 to 2400Z, Oct 17
Worked All Germany Contest	1500Z, Oct 16 to 1459Z, Oct 17
Asia-Pacific Fall Sprint, CW	0000Z-0200Z, Oct 17
RSGB 21/28 MHz Contest, CW	0700Z-1900Z, Oct 17
FISTS Coast to Coast Contest	0000Z-2400Z, Oct 24
CQ Worldwide DX Contest, SSB	0000Z, Oct 30 to 2400Z, Oct 31
10-10 Int. Fall Contest, CW	0001Z, Oct 30 to 2359Z, Oct 31
ARCI Fall QSO Party	1200Z, Oct 30 to 2400Z, Oct 31

NCJ

Adventures in Contesting

Last issue: Pierre, F5JFU, stands by the sign in the small village of Contest in western France. Yes, there really is a village in France named Contest. This brings up a good question. Is Pierre the first ever to go to Contest to contest?

Rick, K6VVA, introduces his fellow operators for the Team Competition in the NAQPs.

RTTY Contesting

John Fleming, WA9ALS

If you've ever been in a RTTY contest, you probably already recognize the call sign of my guest columnist. It seems that Don has won more RTTY contests than Baudot has characters. He is a die-hard champion of SO2R contesting and has the woodwork to prove its utility. Don recently redesigned his station literally from scratch, with the goal of the most efficient SO2R operating configuration for all modes using networked computers. I think Don's article might just help some of us overcome the inertia keeping us from redesigning our own stations. (Be sure to visit **www.aa5au.com** *and* **www.rttycontesting.com** *for Don's excellent RTTY Contesting how-tos.) Thanks Don!*

Remodeling for Mode Independent SO2R Networked Stations

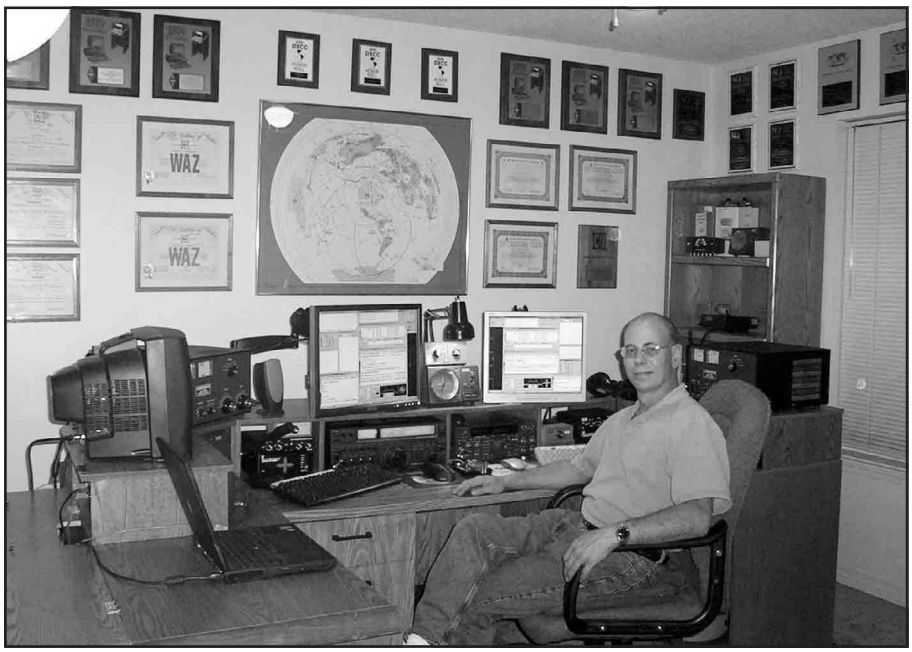
By Don Hill, AA5AU

Having started contesting over 30 years ago at age 16, I can remember my youthful days in Indiana running CW Multi's with the Indy DXers in the basements of Mike Koss (now W9SU) and Les Bannon (now WF5E). I remember elaborate contest station layouts and large homebrew amplifiers with names like "Miss Mibutu" and "The Purveyor of Doom." I always dreamed of having a station like theirs, but as a teenager, they were only dreams.

Soon after high school, life would take me to places more important than contesting. Eventually I would land in Louisiana and catch the contest bug again with those same dreams of having my own nice contest station layout.

I must have caught that bug in a big way. I evolved into an avid SO2R RTTY contester, operating in over 120 RTTY contests to date. And in the course of this evolution, instead of expanding my station layout, I kept piling equipment vertically on one main desk. This worked well enough and allowed me to win several major RTTY contests, but it wasn't very efficient. I knew all along that if something failed during a major contest, I'd be in big trouble. The desk was pushed all the way to the wall, which meant even though I had accumulated a good inventory of spares, changing anything in the heat of battle would be a major chore. The left radio's amplifier was located so far from the main desk that I had to stand to change bands and tune it. But for many years that is how I operated, throwing caution to the wind and riding a wave of luck.

That wave would crash during the March 2004 *NCJ* RTTY Sprint. Due to an error on my part, while running high power, I blew the receiver protection bulb in one of my transceivers just two hours into the contest. I had a spare radio sitting on the shelf, but when I realized the difficulty in changing it out, I quit the contest and shut the station down. As I sat there disgusted, mad at myself for making a careless mistake, it didn't take any behavioral psychology to know change was necessary right away. It was time to remodel the station. And it would be built for any mode, not just RTTY.



Don, AA5AU, at his re-designed SO2R station.

Starting From Scratch

Without any plans, I started disconnecting equipment. In the next three days, I moved everything from the shack to the dining room floor except the main desk. I wondered how I ever got that monster in the room to begin with.

The first thing I did after removing everything was to paint the room. I put two coats of high-quality antique white paint on the walls and doors. I decided to stay with off-white in order to reflect as much light as possible in the room without being too bright. When the painting was finished, I sat at the desk in the empty room and started visualizing a general layout in my head. My vision was for a U-shaped operating position with everything within reach while *sitting* in the operator's chair. I would build horizontally around me and not vertically because experience told me this would be more comfortable and efficient. And I would take whatever time needed to make it right.

Objectives and Goals

I had two main objectives. The new station had to be *comfortable* and it had to be *efficient*. And if I was going to all the trouble of remodeling, it should at least look good, too. I made a list of goals that I used to obtain my objectives:

- All equipment arranged within arm's reach of the operator's chair.
- Allow ease of operation regardless of mode—SSB, CW or RTTY.
- The ability to work behind the desks.

• The ability to replace any piece of equipment quickly and easily.
• New grounding system.
• New 12 Vdc system allowing easy connect and disconnect.
• 240 Vac run into the shack and distributed to all three amplifiers.
• All cabling neatly laid out and hidden.
• A position for a third radio and amplifier as an "on-line" spare.
• Room for expansion including controls for more antennas

Deciding What Goes Where

I thought about what I had to work with and what additional pieces I'd have to acquire. I had my main desk and a smaller desk. I moved them 20 inches away from the walls and put them together in an L shape with the small desk to the left of the main desk. I then decided to build one shelf along the top of the desks and make space underneath for the radios and other equipment. With a jigsaw and fine-toothed blade, I cut pieces from an old wall unit to make the shelf and support dividers. I measured the radios and mounted the shelf using L brackets and leftover brass wood screws from the wall unit. When finished, it came out much nicer than I had anticipated and the radios fit nicely under the shelf. It was a fun start for an experienced operator, but a novice carpenter.

I now needed to think about possible locations for other equipment like rotor controls, amplifiers, band filter switches, external audio filters, TNCs and the SixPak antenna switch. Deciding that rotor controls along with antenna and filter switches were items that needed to be closer to the operator, I arranged the equipment according to priority. I kept moving things around in the following weeks until I finally felt comfortable with the arrangement.

Because I run two networked PCs in my SO2R setup, one computer for each radio, I needed to locate the computers to allow easy access to the back of the PCs. And the computers had to be close enough to allow short cable runs from the sound card and serial ports to radios, TNCs and FSK/CW/PTT interfaces. To accomplish this, I removed the two drawers out of the left side of the main desk and installed one PC in the vacated space. This PC would control the left radio and the on-line spare. To gain access to the back of the PC, I cut out the back of the desk with a jigsaw. I then cut off the outer faces of the two drawers I'd removed and re-installed them on hinges to hide the PC. I was tempted to do the same thing for the right-radio PC, but decided to keep at least a couple drawers in the desk. This second PC was placed under a third desk, purchased for about $40 from a local office supply store, which completed the U-shape design I had first envisioned.

My SO2R philosophy has always been to run each station completely independent from the other. This way, if something fails with either setup, I'm not completely dead in the water. This means everything is separate. Each radio has its own networked PC, external DSP audio filter, FSK/CW/PTT interface, 12V supply and TNC (as a 2nd RTTY decoder). The only thing shared by the two radios is the SixPak antenna switch, antennas, headphone switch and ground system.

In keeping with my philosophy, everything for the left radio would go to the left and everything for the right radio would go to the right of the operating chair. When I finished with the desks and shelf, I had room on the left-hand desk for the on-line spare radio and room on the right-hand desk for future expansion.

PC Monitor Placement

In my previous SO2R setup, the radios were side-by-side in front of me and the PC monitors were all the way out to the left and right of the radios sitting down on the desk. I knew it would be more beneficial to have the monitors side-by-side directly in front of me. Since I wanted both the radios and monitors in front of me, I had to figure how to do it this way.

My first thought was to put the monitors on the shelf directly over the radios. When I did this, I realized I would have to look up to see the monitors. The idea of constantly looking up is not appealing at all to me. Perhaps having the monitors on the shelf would work for CW or SSB, but RTTY requires a great deal of concentration on the RTTY screens. Previously the monitors were on the same plane as my radios, so simple eye or head movements to the left or to the right allowed easy viewing of both radios and monitors. Looking down or straight ahead takes little or no effort. Looking upward over the course of a long contest would introduce a fatigue factor I wouldn't accept. Since one of my objectives was comfort, I put a lot of thought into monitor placement and it became a high priority. I realized I would probably have to spend some money to get it right.

I had one 19-inch CRT and one 17-inch LCD monitor. The CRT is huge and takes up a lot of space. There was no way to lower it to a comfortable viewing height. I realized the answer was to replace the CRT with an LCD and to attach both LCD monitors to arms so I could move them to any comfortable viewing position. This way they could be placed directly in front of me during contests. Searching the Internet I found the most popular arms for LCD monitors were made by Ergotron. But at $375 apiece new from Ergotron, I was discouraged because it was more than I was willing to pay for this solution. Browsing further, I found and purchased two brand new Ergotron model 300 arms from Mendelson's (of Dayton Hamvention fame) for $150 each.

While looking for an LCD monitor to replace the CRT, I discovered there were too many to choose from. That same day, Dell put their 20-inch LCD monitor on sale. It was expensive, but I had to accept that there would be cost involved because of the high importance I'd put on monitor placement. With income tax refund money in hand, I purchased the Dell.

When the Dell LCD monitor and Ergotron arms arrived a few days later, I felt like I'd made a great deal. The Ergotron arms are impressive. They are extremely heavy-duty. Assembly and mounting the arms was easy. I mounted them to the back of the shelf allowing movement of the monitors to any position. Not only was this the ultimate solution, it looks cool. Solving the monitor problem was a major relief. By the end of March, the station was starting to take on a comfortable look and feel, but there was still much to do.

Ground and 12 Vdc System

I installed a new ground system by mounting a solid copper plate to the back of the desk and running ground wires to every piece of equipment. I then grounded the copper plate to a new 8-foot ground rod outside the shack wall.

Twelve-volt dc power distribution was solved with the addition of two 4010S RIGrunners. In keeping with my philosophy, one RIGrunner was for the left station, the other for the right station, both mounted to the back of the desk. I found the RIGrunners to be nice additions to the shack. The PowerPole connectors were easy to install. I replaced each dc cable to every piece of equipment with red/black power cable custom cut to length back to the RIGrunners.

240 Vac System

I had always powered my AL-80A amplifiers on 110 Vac. However, with the addition of an Icom IC-PW1 to the station, I needed 240 Vac. Running 240V into the shack was made easy by the fact that there was a spare 240V breaker for an electric stove in the kitchen. Since my stove is gas, this breaker was unused and a stroke of luck since there was no room for additional breakers in the panel.

Running the cable through the attic was a breeze made easier when I found

an existing hole in the 2 × 4 leading down the wall to the opening where the antenna and rotor cables enter the shack.

Cleaning Up Loose Ends

One of the goals in rebuilding the station was to neaten the cabling and hide it from view when possible. I redid the cabling several times and it was the most difficult part of the job. I eventually came to realize it would never look perfect. The best I could hope for was to contain the nearly one hundred cables and wires in some sort of system of cable guides made from inexpensive utility racks mounted to the back of the desks. With the cables neatly routed, after six weeks of remodeling, the station was ready for testing.

The best way to test the station would be during an actual contest. So, in the course of remodeling, I made limited efforts in both the SP DX and VOLTA RTTY contests. During those tests, when I found something that needed to be changed, I made the adjustment.

Electing not to go to Dayton this year enabled me to operate the Anatolian RTTY contest in mid May. Knowing this is not a popular contest, I still decided to put in a serious effort. Despite barely making 400 contacts running high power, it was a good enough test to tell me the station was battle-ready. Was it finished? In reality, a contest station is never finished, is it? There always seems to be room for improvement that makes tinkering with details one of the fun aspects of tweaking our stations.

During the Anatolian test, I simulated a power supply failure by turning the dc supply off to the left station. With a spare power supply mounted to the rear of the desk, I simply unplugged the "failed" supply from the RIGrunner and plugged in the spare. The left station was back up in less than 30 seconds. With plenty of spare power supplies on-hand, this got me thinking. What if I installed a pair of heavy duty 12V relays to each RIGrunner, connecting one set of contacts to the main supplies and the other to a spare supply? If the main supply is lost on either station, the relay coil would de-energize sending the RIGrunner contacts to the spare supply automatically. This was a sweet idea that needed more thought and not the only one to come to me that weekend.

The first major test will be the NAQP RTTY contest in July. I'll probably miss ANARTS in June because something must be done about all the new aluminum in the backyard that needs to go up in the air. Sometimes it takes a while, but dreams can come true even though Miss Mibutu and the Purveyor of Doom are not part of them this time. NCJ

Contesting for Fun

Brian Kassel, K7RE

That Old Contest Itch—No, It Ain't Them Bugs Neither

As you read this, summer is at its peak, and the contest calendar looks mighty bleak. To add to our sorrows, those good old sunspots are disappearing at a rate that's even greater than I am losing my hair. Sure, we have sporadic E from time to time, but those good old daily openings to far away DX points are only a memory for the most part. So what to do?

Well, summer is also the time when us Northern types can get out and do a little communing with nature. QRP operation seems to go well with outdoor activities. Just a small gel cell and a few other accessories are all that's required to get on the air and have a blast.

For just getting on and having fun, I use my Elecraft K-1. I leave my two K-2s at home, as they are my serious contesting radios. The only time that they leave the nest is on my low-impact DXpeditions, usually to the Bahamas during the winter contest season.

The K-1 is ideal and small and is easily powered by internal as well as external 12 supplies for many hours of operating. I like to bring along a very small solar panel to prop up against the rig to shield it from the sun as well as to charge the batteries. A good place to look for cheap small panels is Electronic Goldmine at: **sales.goldmine-elec.com.** Also, check out **www.allelectronics.com.** They offer free catalogs, shopping and buying on line and have some great deals on surplus cell phone battery packs of the NiMH and Lithium Ion types. With a little elbow grease, and you can have a state-of-the art battery pack for mere pennies.

If you don't like the idea of building a kit or modifying existing accessories, though, the Yaesu 817 transceiver is a good choice. It is a lot harder on batteries, but offers VHF and UHF. If you plan to do CW, you will certainly need the optional filter. May and June are very active months for sporadic E openings on 6 and 10 meters. It sure is a kick to work a mini-pileup from a campground in neighboring Wyoming on 6 meters with a low dipole and few watts. I use an old IC-505 transceiver for that mission. It is a VXO controlled 3-W SSB/CW rig from the mid 1970s. It has no scanning capabilities, and it is easy on the wallet when found on the used market.

Another off-the-shelf radio of note is the IC-703. It is the QRP version of the very popular IC-706. I like the built-in antenna tuners that the newer radios offer as well. In the K-1, the tuner uses mechanically latched relays. This means that once the tuner figures out its settings, the relays are set to that position on every band with no power required to keep them energized, which is a big advantage when it comes to battery life.

I Need a Fix, Not a 12-Step Program

What of the contests, though? Well, one of my favorites is the "BUBBA" event held in August. I have mentioned this one last year at this time, but offer it up again as a just plain fun event. Everyone is QRP, and one's multipliers are based on the highest temperature recorded at the operating position. It is the opposite of the "FYBO" contest held in February, where the lowest temperature is part of the multiplier factor. BTW, the word "BUBBA" is an acronym for Burn your B_'s Off. "FYBO," of course, is broken down to Freeze Your B_'s Off. Hey, you can't say that QRP types don't have a sense of humor.

For more information such as the exact dates, etc., of most QRP and field oriented contests, see the American QRP Club contesting page at **www.amqrp.org/contesting/contesting.html.**

I also want to remind you of the monthly Adventure Radio Society's Spartan Sprint. This is held on the first Monday of each month, but takes on special significance during the summer months when we are outdoors. This event is based on the weight of your rig, so the lighter the more bang per QSO. It is only 2 hours long, and special attention is paid to those who are in a field-operating situation. It is not unusual for many to make 50 to almost 100 QSOs during that very brief 2-hour period. The time *really* flies by. Many stations are amazingly strong with just 1 watt or less. Seems as though I always work at least a few stations at the milliwatt level. Look at their page at **www.arsqrp.com.** And specifically their outdoor oriented QRP contests at **www.arsqrp.com/ars/pages/pageone_material/events_idx.html.**

Also, look at their popular "Flight of the Bumblebees" contest held in July, as well as their "Top of the World" program. Their free Web-based ARS "Sojourner" newsletter is always fun reading.

After your time in the field, you may want to come back home and total all of those field QSOs to see if you might be eligible for an award or two. If you are into awards, as well as a lot of information about QRP and homebrewing in general, look at the QRP Amateur Radio Club International page at **www.qrparci.org**.

You're as Young as You Feel—On a Good Day

A word, too, about safety. I know that as I approach my 60th birthday, my body refuses to take the abuse that I used to inflict upon it just a few years ago. I'm not pointing any fingers, but we all know that the average age of hams is creeping upward. Let's be careful out there. One doesn't have to climb the highest mountain in the county to hook up a field radio and have some fun. A trip to the local park, a nearby lake or a trip out to a local forest with a field radio can yield more fun than many might imagine.

Tune in, Turn On, Get Infectious

If you do set up in a public place, don't forget to be prepared to do a little public relations for the hobby. In these days of threats to our hobby from outside forces, we can do a lot by setting a good example.

We are all doing this to have fun. A little transference of fun can go a long way in making a case for our very existence. Make your fun infectious. Take along a niece, or nephew, a neighbor kid, someone from your church, or social organization. Ham radio needs all the positive PR that we can muster these days. Let the fun continue…well after our keys fall silent. NCJ

Contest Tips, Tricks & Techniques

By Gary Sutcliffe, W9XT

Mode Specific Tips

Some contest tips are pretty generic, and can be applied to just about any mode, but this installment of CTT&T will look at tips, tricks & techniques that only apply to a single mode. Hopefully you will pick up a new one for your favorite contest mode: CW, phone or maybe one of the digital modes.

CW Tips

AA4LR passes on a tip he discovered while operating a multi-op WPX effort. Bill and his partner Rick, NQ4I, were trading off every hour or so. Every time they switched operators, their CQ rate would increase for about 5 minutes or so. Rick would have the keyer set to 32-36 WPM, while Bill preferred a more relaxed 24-26 WPM. Changing speeds would bring in a different set of callers. Based on this experience, Bill suggests changing your CW speed when your rate drops.

Peter, DL4FN, also has comments on varying CW speed, especially on the low bands. If he has trouble breaking the pile up, he will often send slowly, around 10 WPM to stand out from the other callers. If the other stations seem to be sending slowly, he speeds up.

If you are working stations over the pole, especially on 20 meters, be aware of possible flutter on your signal. This can cause the dits and dahs to run together if your CW speed is too high. You might find your rate will increase under these circumstances if you reduce your WPM.

Back in the days of paper logging DL4FN taught himself to send with his left hand. This allowed Peter to send with his left hand and write with the right hand. Even after converting to computer logging, Peter finds the flexibility of keying with his left hand to be useful in distributing the work between both hands. If you want to try to send with your other hand, reverse the paddle so that your thumb keys the same element as your normal thumb. It will be much easier to learn this way.

Selecting your transmit frequency can be critical when answering another station's CQ. Normally you will want to zero beat the other station to be sure you are in his pass band. If the other guy is using a very narrow filter he may not hear you if you are off frequency a bit. If the other station does not answer you or anyone else after a couple of calls, try shifting your transmit frequency up or down and give him another call. He may have left his RIT on from a previous QSO.

Phone Tips

Several commentators are die-hard CW operators who gave their suggestions for phone contests. KJ9C's suggestion is to stay out of phone contests, but he still operates some phone contests to help his club. K5ZD suggests using phone contest weekends to spend time with the family, and W2UP has to prepare for them by trying to find his microphone.

Most of the stations you work in a contest are not operating seriously. In a phone contest, especially a small contest or a state QSO party, a large number of the operators you work may not even be in the contest. You need to convince them to give you a contact. KG5U recommends keeping your voice sounding friendly while CQing. "You want the contest pros, but you also want to draw the non-contesting folks out of the woodwork, too" says Dale. During slow times, Dale's CQ is something like "CQ contest, you need not be in the contest to give me a point."

Along similar lines, I will make a big deal with new out-of-state multipliers while operating the Wisconsin QSO Party. "Gee thanks for California! That's a new multiplier!" The idea is that hopefully there is a Nevada or Vermont lurking in the weeds and this will convince him to call me and be the hero who gives me their rare state.

Exchanges including your state or county can be difficult to get through to those not familiar with them. Unless you live in New York or California you are often better off giving the abbreviation instead of saying the state. For example in ARRL DX or while working DX in the ARRL 10 Meter Contest I will normally say "59 Whiskey India."

Counties can be difficult in state QSO parties. Most QSO parties give recommended abbreviations that really help for CW but may be less useful for phone, especially when working stations that are not really in the contest. I try to come up with another gimmick. I live in Washington County and if someone is having trouble getting it I will repeat "Washington County, like George Washington." My last QTH was in Dodge County, and I would say "Dodge, like the car."

Working split is a fact of life on 40 meters in DX contests. Randy, K5ZD, recommends always announcing the call of the station you are working when you respond to give your report. It only takes an extra few seconds, yet will provide confirmation of whom you are working. Many times there are multiple stations listening on the same frequency so you don't want someone to log you in error, then have them not call you later!

NØAX has suggestions for mode appropriate food. For phone contests, Ward chooses food that you can eat while talking (soft or sippable) and that you can shovel into your mouth around a boom mike. Avoid crunchy foods that can cause intense local QRM.

RTTY Tips

W2UP checks out reception and transmission on each radio. Barry notes the cables sometimes get intermittent after months of disuse.

Billy, AA4NU, has a few suggestions for preparing for RTTY contests. First, clear your TNC/Software "defaults" for anything amiss. Then check connections for RFI and other problems. Finally, call a nearby friend and have them confirm all is 100% on your tones. I seem to see a pattern developing here.

That wraps up this installment of CTT&T. Thanks as always go to our readers who send in their tips for the topic. This time it includes AA4LR, AA4NU, DL4FN, K5ZD, KG5U, KJ9C, N0AX, N3BB, W2UP and W6ZZZ.

Topic for next time (Deadline July 12, 2004): Contesting in your golden years. It's no secret the average age of hams is going up. As the number of solar cycles you spend contesting increases, how has this affected or how do you expect it to affect your contesting activities? What changes have you made or expect to make to your station and antenna system?

Send in your ideas on these subjects or suggestions for future topics. By postal mail to 3310 Bonnie Lane, Slinger, WI 53086, or via e-mail to **w9xt@qth.com**. NCJ

Contesting on a Budget

Paul Schaffenberger, K5AF

Getting Power to the Antenna, Cheaply!

Many of us started out in ham radio not fully understanding or appreciating all the variables involved in getting power to the antenna. My approach in the 1960s was simple. Park the operating desk near a window, bring the end of the longwire antenna in through the window, plug it directly into the transmitter antenna jack and use the wide-ranging pi-network to tune it to resonance.

I remember buying my first roll of RG-58 in the late 1960s for the outrageous price of 10 cents a foot, wondering the whole time why I really needed this stuff. I think that Bill, AA4LR, probably speaks for all of us as he describes how his buying habits and understanding of feedlines have evolved:

"When I first started in Amateur Radio, I bought the cheapest feedline I could—RG-58A/U. Now I avoid the stuff.

"I used to use RG-8X to my antennas, but my longest run was 85 feet. At the new station, I have runs of 135 and 150 feet so I use RG-213. Better specs than RG-8X, although it is three times more expensive, but isn't as expensive as hardline.

"Basically, the feedline choice is a compromise between loss and expense. It's tempting to scrimp on feedlines, as I did when I started, but you're better off spending a bit more to get less loss."

Doin' the Math

Bill's analysis is right on, and reflects the theory behind feedline losses. There are three factors involved: feedline loss is the sum of resistive losses, radiation losses and dielectric losses. Resistive losses are the losses caused by the resistive properties of the conductors themselves, based on Ohm's law. Most quality transmission lines today use high-quality conductors that minimize these losses.

Radiation losses occur when the feedline actually radiates instead of acting as a means of transferring power. Radiation losses can occur through leakage currents, when RF passes through the coaxial braid, but this is almost minimal in the HF range with even the cheapest coax. The far greater concern is radiation caused by induced currents on the outside braid of the coax. Choke baluns, ferrite sleeves and other means, however, can control these currents.

What we're left with in coax is primarily dielectric loss—essentially the loss caused by the insulating material between the conductors. Two important considerations: dielectric losses tend to increase with the age of the dielectric, and the losses are exacerbated exponentially by the SWR.

It is not unusual to see 3 dB difference between two similar-looking lengths of feedline. That may not seem like much, but it represents a 50% loss of power. It means that the guy with a $1000 800-W amplifier feeding hardline into a low SWR load might actually see more power at the antenna than the guy with the $3000 1.5-kW linear who is using an older coax run into a higher SWR load.

The balanced feeder model is somewhat more complex. Even with twinlead and slotted feedline with PVC insulation, the dielectric losses are often lower than even expensive hardline. Open feeders with good-quality spacers offer incredibly low losses, but are not without their challenges.

While open feeders offer low dielectric losses, radiation losses can be a factor. The radiation losses can occur because of an imbalance in the currents in the parallel lines. This can be caused by a poorly balanced load, by a balancing device (balun or balanced tuner) that is ineffective, or by disruptions to the balance, such as metallic objects in the field of the transmission line.

Other considerations that must be dealt with are the effects of weather on balanced feedlines and efficiency of the antenna tuner. The equation for losses for balanced feedlines therefore must include radiation loss, dielectric loss, tuning network loss and balancing device loss.

Measure, Measure, Measure

The only way to truly know what is going on with your feedline is to measure it both initially and periodically. Jukka, OH6LI and Gary, W9XT, both describe using an antenna analyzer to determine losses. This technique is described in the instructions for all the popular antenna analyzers out there, but it also comes with the caveat that it is approximate only.

I recommend actually measuring the power loss of a length of feedline by simply inserting it into the line ahead of the wattmeter before actually installing it. You can actually see the power loss into a dummy load, or you can see the added effects of SWR on loss by testing it into an actual antenna. The results can be sobering. I checked a 150-foot length of very high quality coax at 30 MHz. The loss was only about 1 dB per 100 feet, seemingly insignificant, but it actually represented a loss of 30 of my 100 W at the antenna and caused me to figure out a way to use a shorter run.

Initially checking your losses is certainly important, but the only way to ensure continuous efficiency is to have a periodic schedule for performing checks. Gary, W9XT and Bill, AA4LR, check their feedlines and antennas for changes and losses every couple of years. Jukka, OH6LI, plots the SWR curves of his antennas and looks for any changes over time. Billy, AA4NU, establishes a baseline for each of his antennas (i.e., 100W into the 80-meter array equals 92 W at the phasing network, etc). This allows him to check for problems, and also to observe the effects of time on the feedline.

Balanced feeders are not as prone to dielectric changes over time, but can be similarly checked. Usually a major change in tuner settings indicates a problem. Performance and balance can be measured using an RF ammeter both at the tuner output and at various points along the feedline.

Applying the Theory

Knowing that we have losses and knowing how to measure them, how do we inexpensively avoid them? Randy, K5ZD, provided a BFO (Blinding Flash of the Obvious) answer to this question—keep the radio as close to the antenna as possible! Smart. Fifteen hundred watts through 300 feet of feedline at 1 db loss per hundred feet results in 750 W at the antenna. The same power through 150 feet of the same feedline will result in about 1150 W to the antenna. Quite a difference!

Several others—including K4XS, K1TTT, OH6LI, K1IR, K4ZA and W9XT—suggest CATV hardline for minimizing losses. Despite the 75-Ω impedance and the problem with connectors, there are resources available to deal with these issues. Don, K4ZA, notes that sometimes CATV companies actually *pay* to have it hauled away. K1TTT likes getting the roll ends (often 300 feet or more) and suggests that the empty rolls make good "red-neck picnic tables." My kind of budget contester!

With the proliferation of cell phone towers and repeaters, more 50-Ω hardline is becoming available. Jim, K1IR, suggests keeping your eyes open and being bold about asking for available freebies. Often contractors are interested in getting the job done fast and leftovers are a minor issue. Bill, K4XS, points out that a teardown operation is often a good place to find bargains. He got 1500 feet of $1^{5}/_{8}$-inch heliax for just $300 a few years ago.

K4RO also prefers the used route.

What are the rewards for these efforts? Hardline will save up to a dB per 100 feet over mid-grade coax at 30 MHz. That becomes a significant decrease in losses when coax runs are in the hundreds of feet.

There are bargains to be had with balanced line as well. Mike, W7DRA, finds RadioShack twinlead to be very inexpensive and effective for use on his 160-meter verticals. Hal, N4GG, likes using Sexton open line, a 300-Ω feedline that was used for TV in the 1950s and is still available at swap meets. Others, such as Don, K4ZA, "roll their own." Don used Teflon coated wire and EF Johnson spacers. I've made hundreds of feet of open feedline using spools of #18 coated wire and 6-inch plastic circuit board holders as spacers.

Some Practical Tradeoffs

We are a flexible and practical lot. Sometimes savings are only incremental, but still can have a positive impact on our overall operation. If "gifted" with a 100-foot piece of hardline, most of us would patch that into an existing coax run because it would reduce the cumulative losses. Some of us don't want to haul hardline up the tower and instead use a good-quality coax for that portion of the run. Still others are willing to use short runs of RG-58 because of the flexibility and small size it provides.

The important thing to realize is that all losses are cumulative. It is especially important to analyze where cutting losses could have the greatest impact. This is especially important for those runs utilizing remote switching to multiple antennas, as the decreased losses are felt at several destinations.

Billy, AA4NU, takes a very practical approach. His design philosophy is "the higher the frequency, the better the feedline to be used." He has no problem using RG-8X for 160 meters, while progressively using the better quality feedline for higher frequency antennas.

An incremental step in improving feedline performance is upgrading from older-style coax to the new "buryable" coax, which is lightweight, durable and compares quite favorably with hardline. I've used that with my low power setup and find it very low-loss and easy to work with.

The use of tuners and open feeders seems to be largely a low-power phenomenon. This is often because exposed feeders in the shack often cause RF problems. There are a couple of ways of mitigating the problem. Tom, K5RC, remoted the tuner for his 160-meter delta loop into his adjoining garage, because having it in the shack "…caused his linear to try to jump off the table." While this solution is not convenient for quick frequency changes, remoting the balun is a practical alternative. By using a short section of 50- or 75-Ω hardline or coax to the 1:4 balun, you can sometimes eliminate the "RF in the shack" problem. KU8E and AA4LR recommend this approach. Be aware, however, that high SWR, even with a short length of low-loss cable, can result in significant losses.

Some find the advantages of tuners and open feedlines not worth the hassle. AA4NU doesn't use them anymore, as it is part of his Keep-It-Simple-Stupid (KISS) approach to station design—less things to adjust and go wrong. Everything is a tradeoff, and cost, performance and convenience are all factors in the final equation.

Thanks to K1IR, N4GG, AA4LR, K4RO, N4ZR, K4ZA, K5RC, K5ZD, OH6LI, W7DRA and W9XT for their excellent input. I am working on another guest columnist for the next issue who I believe will bring a unique perspective. Stay tuned. NCJ

February 2004 *NCJ* NAQP RTTY Contest

Wayne Matlock, K7WM

Only two words can describe the February RTTY NAQP—*my word*! With decent propagation, a whole lot of new RTTYers, a whole lot of the regular ops, more teams than ever before, and more multi-two stations made the competition hot and heavy for the entire 10 hours for single ops and the full 12 hours for the multi-two stations. There were four multi-two teams this year and all finished the contest with some fantastic scores. The multi-two team of W6YK, with operators K6UFO, N6DE, N7MN, W6LD and W6GEM, finished with a score of 210,056 and that averages 175 QSOs an hour for the 12 hour period or 2.9 QSOs a minute. The top single operator was Don, AA5AU, finishing with a score of 143,058. He was chased hard by Chas, KI5XP, with a score of 141,688. This averages out to 143 QSOs an hour or 2.38 QSOs a minute for Don and 141.6 an hour or 2.36 QSOs a minute for Chas—pretty close.

Ten meters was open but no one would come up and stay for any period of time. For a single operator with a single radio, it wasn't productive enough to hang around and pick up the lookers when they would come up and make a contact or two. With 15/20 being as busy as they were, that made 10 meters less attractive than it was. If you check the score of the multi-two team of W6YK, 10 meters made the difference. The team of South West Arizona Contest Club (SWACC), comprised of K5AM, K6LL, KI6DY, W7WW, and K7WM, got on a roll and all members finished well, making the team score a whopping 560,772.

The gauntlet has been thrown in all classes and for each state high score for the next RTTY NAQP, with some great scores to be bested. Score deduction was minimal this test and was still primarily for off times. The NA islands are still not having the proper ID entered in the QTH field, resulting in Cabrillo kicking it out. I received approximately 11 logs for the ARRL CW, CQWW SSB WPX, and the *NCJ* CW NAQP. The operators were contacted and the correct log was returned. Numerous logs came in with no call or class entered in the subject area and required opening the log to ascertain who it was and where it went and it was evident that not all operators had read the rules as I received numerous logs after the two week cutoff date. I included all received logs and overall the logs were in great shape.

I appreciated just receiving a .txt log when the op wasn't sure if their Cabrillo converter was correct. Makes it a lot easier to convert when it comes in rather than having to stop during the log checking process and convert it to something that Cabrillo will score.

That's it for this running of the RTTY NAQP. Hopefully the July contest will be somewhat similar but who knows what the propagation will do to us. In any event, thanks to all who participated and a special thanks to all who sent in their log.

TOP TEN

QSOs		*MULTS*		*SCORE*	
KI5XP	712	K7WM	212	AA5AU	143,058
AA5AU	678	AA5AU	211	KI5XP	141,688
K6LL	631	W7WW	210	K6LL	129,986
W7WW	594	K6LL	206	W7WW	124,740
AB5K	577	KI5XP	199	K7WM	114,268
KI6DY	555	WØYK	196	AD6WL	103,545
K7WM	539	AD6WL	195	K5AM	99,640
AD6WL	531	K5AM	188	AB5K	98,667
N2WK	530	K5DU	177	KI6DY	92,138
K5AM	530	K6RIM	177	WØYK	86,240
NNØG	487	AB5K	171		

NCJ RTTY NAQP TEAM RESULTS

COCOSOLO SIBICHI

NP3D	18,912
N2TA	418
	19,330

TCG SAMBA

KM4H	2772
N1WI	0
WI8W	64,815
K6DSP	0
WA4OSD	11,808
	79,395

SWACC

K5AM	99,640
K6LL	129,986
KI6DY	92,138
W7WW	124,740
K7WM	114,268
	560,772

TCG RUMBA

W4LC	44,744
W4BCG	48,280
KW7N	42,296
K5HP	67,236
W9WI	17,028
	219,584

FLORIDA BOYS

AF4Z	62,062
K4PX	65,031
KC4HW	82,203
WB4EQS	44,388
WO4D	60,295
	31,3979

TCG TANGO

N2WK	84,800
AI9T	73,386
VE1OP	68,452
KI5XP	14,1688
W4GKM	55,044
	423,370

TCG CHARLESTON

N9KO	25,380
W4TDB	0
K9MI	5372
K4BEV	0
KSØM	25,850
	56,602

SMC#1

K9JS	49,275
WE9V	8316
K9WX	46,550
AI9L	0
W1TO	31,707
	135,848

AUSTIN POWERS #1

AB5K	98,667
KC5YKX	66,165
KS5V	38,868
NT5TU	40,750
WA4PGM	56,771
	301,221

AUSTIN POWERS #2

K5DU	81,951
KG5U	0
K9SEX	67,368
	149,319

TCG WALTZ

K4RO	4312
WO4O	50,786
KE4OAR	63,000
AD6WL	103,545
K4WW	25,750
	247,393

NCCC #1

WØYK	86,240
K6RIM	76,287
W6ZZZ	16,910
N6RCE	3876
KJ6RA	31339
	377179

CONTEST CLUB ONTARIO

VA3PC	40,920
VE3ESH	0
VE3RZ	0
VE3HG	26,269
VE3GSI	50,040
	117,229

NCCC #2

ND2T	58,065
NT6K	0
W6IXP	0
WK6I	8496
	66,561

FEBRUARY 2004 NCJ RTTY NAQP RESULTS SINGLE OPERATOR

CALL	NAME	80 m	40 m	20 m	15 m	10 m	QSO's	MULTS	SCORE	TEAM
KI6DY	BOB	145/44	122/40	171/44	108/34	9/4	555	166	92,138	SWACC
NNØG	DANA	108/41	130/41	149/41	98/37	2/1	487	161	78,407	
KØFX	DON	85/38	133/43	108/37	84/35	11/8	421	161	67,781	
NØKE	PHIL	67/32	74/35	109/37	72/29	19/11	341	145	49,445	
KØRFD	RALPH	73/35	60/31	98/40	37/22	6/5	274	133	36,442	
KSØM	DICK	50/28	70/34	94/33	16/11	5/4	235	110	25,850	TCG CHARLESTON
KFØOH	BILL	64/35	57/29	50/24	21/12	13/3	205	103	21,115	
NØAT	RON	4/4	58/32	95/37	44/20	10/3	211	96	20,256	
KFØUR	SHEL	0/0	32/20	136/41	64/25	0/0	232	86	19,952	
WØKCF	KEVIN	30/14	31/18	68/32	55/24	0/0	184	88	16,192	
WØTY	TONY	54/33	74/36	19/11	0/0	0/0	147	80	11,760	
NØKBD	DAVE	17/11	54/28	78/28	6/4	0/0	155	71	11,005	
KCØPIF	PAUL	26/17	39/21	38/19	32/20	4/2	139	79	10,981	
WØHW	CHAZ	0/0	41/24	53/24	45/21	2/1	141	70	9870	
WØRY	BOB	0/0	38/19	38/23	25/15	3/3	104	60	6240	
KØXU	JIM	40/25	37/25	17/10	0/0	0/0	94	60	5640	
AAØCY	NAVAAD	0/0	28/22	41/20	22/10	2/2	93	54	5022	
KEØWW	MIKE	0/0	23/13	20/11	15/9	9/3	67	36	2412	
KØVG	VERN	22/15	7/6	0/0	0/0	4/1	33	22	726	
WYØV	GARY	0/0	6/5	15/11	9/6	0/0	30	22	660	
N1MGO	GORDON	109/39	102/36	106/37	79/22	5/1	401	135	54,135	
KB1JZU	BOB	84/37	93/35	83/34	20/12	4/2	284	120	34,080	
W1TO	**TOM**	**86/35**	**77/35**	**74/30**	**28/13**	**6/4**	**271**	**117**	**31,707**	**SMC#1**
K1DAN	DAN	129/44	32/19	110/35	11/8	0/0	281	106	29,786	
W0BR/1	BOB	89/39	55/28	52/20	37/17	8/6	241	110	26,510	
AJ1M	JAY	80/33	80/33	40/23	30/16	0/0	230	105	24,150	
KB1HDO	JOHN	2/2	42/35	70/29	36/15	2/1	152	72	10,944	
KT1I	CHARLIE	24/18	39/23	63/27	8/7	0/0	134	75	10,050	
W1HY	PAUL	0/0	1/1	36/22	41/13	8/4	86	40	3440	
AB1CY	JIM	9/7	11/8	25/18	0/0	6/4	51	37	1887	
N2WK	WAYNE	111/39	162/50	140/40	96/23	21/8	530	160	84,800	TCG TANGO
WA2ETU	CARL	115/44	143/48	100/37	65/21	20/6	443	156	69,108	
NO2T	JERRY	66/32	59/26	62/26	43/18	2/2	232	104	24,128	
NP3D	ANDREI	50/28	53/28	52/21	34/14	8/5	197	96	18,912	COCOSOLO SIBICHI
NA2M	BILL	38/25	78/36	16/12	26/11	0/0	158	84	13,272	
KF2XF	DON	0/0	40/23	64/28	43/22	11/7	158	80	12,640	
W2OWL	HOOT	0/0	37/23	81/30	12/7	0/0	130	60	7800	
K2PH	PAUL	11/10	20/12	35/17	15/7	0/0	81	46	3726	
WA2AFD	HOWARD	0/0	13/10	55/26	2/2	0/0	70	38	2660	
N2TA	SERGE	11/11	11/8	0/0	0/0	0/0	22	19	418	
K3GP	GEO	136/44	106/44	76/28	42/12	4/3	364	131	47,684	
W4ZE	TED	46/40	100/43	83/31	56/19	11/6	296	139	41,144	
N3FR	BOB	106/37	51/25	107/33	66/19	9/4	339	118	40,002	
W3BP	BRUCE	64/32	125/41	109/33	19/11	8/6	325	123	39,975	
N3NZ	NOEL	0/0	38/22	90/30	30/12	3/3	161	67	10,787	
W3FQE	LEE	0/0	0/0	25/16	25/12	0/0	50	28	1400	
K3FH	MIKE	5/5	0/0	0/0	0/0	0/0	5	5	25	
KC4HW	JIM	76/35	99/39	181/46	106/37	24/11	486	168	82,303	FLORIDA BOYS
WX4TM	TOM	117/42	130/47	173/48	47/20	11/6	478	163	77,914	
K4PX	GEORGE	39/24	129/44	141/46	84/36	16/9	409	159	65,031	FLORIDA BOYS
N2XD	JOHN	128/44	120/40	146/43	30/11	21/11	445	149	63,305	
AD4EB	JIM	85/39	100/39	158/47	53/24	11/6	407	155	63,085	
KE4OAR	CHUCK	114/41	133/46	113/41	44/16	16/6	420	150	63,000	TCG WALTZ
AF4Z	DON	45/28	88/38	178/46	89/39	3/3	403	154	62,062	FLORIDA BOYS
WO4D	**ORRIN**	**68/33**	**94/39**	**161/45**	**52/28**	**14/10**	**389**	**155**	**60,295**	**FLORIDA BOYS**
W4UEF	**RICK**	**72/41**	**135/47**	**116/45**	**41/20**	**11/5**	**375**	**158**	**59,250**	
WA4PGM	**KYLE**	**120/40**	**109/43**	**91/32**	**66/21**	**11/7**	**397**	**143**	**56771**	**AUSTIN POWERS #1**
W4GKM	**NICK**	**112/42**	**164/49**	**82/30**	**38/18**	**0/0**	**396**	**139**	**55,044**	**TCG TANGO**
W4UK	**JERRY**	**102/37**	**135/47**	**74/29**	**44/18**	**28/10**	**383**	**141**	**54,003**	
K4FJ	STEVE	73/33	108/39	113/37	72/25	15/6	381	140	53,340	
WO4O	RIC	98/45	79/31	169/43	25/11	8/4	379	134	50,786	TCG WALTZ
N4GVA	SCOTT	32/23	120/46	127/43	44/23	17/7	340	142	48,280	
W4BCG	BILL	100/37	106/44	119/37	25/15	4/3	354	136	48,144	TCG RUMBA
KE4KWE	TOM	79/31	106/40	101/34	47/20	23/10	356	135	48,060	
WB4EQS	**RON**	**33/27**	**80/35**	**139/47**	**63/23**	**9/5**	**324**	**137**	**44,388**	**FLORIDA BOYS**
W4LC	JIM	128/45	108/47	54/28	27/11	12/5	329	136	44,744	TCG RUMBA
K4WW	DUC	35/24	74/34	101/31	31/10	9/4	250	103	25,750	TCG WALTZ
K4IQJ	DICK	61/32	71/33	69/30	18/9	7/2	226	106	23,956	
K4SV	DAVE	62/31	67/34	53/28	27/11	6/5	215	109	23,435	
W6IHG	**JERRY**	**12/11**	**63/33**	**86/35**	**51/17**	**8/5**	**220**	**101**	**22,220**	
WB2RHM	**BEN**	**59/33**	**53/28**	**55/29**	**43/15**	**0/0**	**210**	**105**	**22,050**	
K4VU	ROB	34/22	54/28	71/27	36/13	11/4	206	94	19,364	
K4BX	BILL	15/14	63/40	78/35	29/13	15/16	200	98	19,600	
W9WI	**DOUG**	**17/14**	**59/28**	**93/28**	**21/11**	**8/5**	**198**	**86**	**17,028**	**TCG RUMBA**
W6DSQ	**FRANK**	**68/38**	**85/35**	**20/12**	**0/0**	**0/0**	**173**	**85**	**14,705**	
WB6BWZ	**MATT**	**19/12**	**71/34**	**51/23**	**23/11**	**9/5**	**173**	**85**	**14,532**	
K4MA	JIM	22/16	52/21	36/25	26/10	13/9	149	81	12,069	
WA4OSD	FRANK	29/21	46/26	40/20	21/11	8/4	144	82	11,808	TCG SAMBA
N4GN	TIM	53/30	67/27	0/0	0/0	0/0	120	57	6840	
K4RO	KIRK	0/0	0/0	63/26	24/13	11/5	98	44	4312	TCG WALTZ
KM4H	MIKE	6/6	10/9	21/14	29/13	0/0	66	42	2772	TCG SAMBA
W4NTI	DAN	0/0	35/21	19/14	0/0	0/0	54	35	1890	
KV4CN	DAVE	0/0	0/0	36/18	9/6	0/0	45	24	1080	
AA5AU	DON	120/45	177/53	193/50	152/49	36/14	678	211	143,058	
KI5XP	CHAS	129/44	213/51	195/51	153/43	22/10	712	199	141,688	TCG TANGO
K5AM	**MARK**	**116/43**	**133/43**	**148/43**	**112/46**	**21/13**	**530**	**188**	**99,640**	**SWACC**
AB5K	TERRY	31/19	176/52	184/47	167/43	19/10	577	171	98,667	AUSTIN POWERS #1
K5DU	SUSAN	90/37	115/46	128/39	107/40	23/15	463	177	81,951	AUSTIN POWERS #2
KK5OQ	**CHARLES**	**50/30**	**138/51**	**161/43**	**74/30**	**21/10**	**444**	**164**	**72,816**	
K9SEX	MIKE	69/38	105/40	102/39	94/37	31/14	401	168	67,368	AUSTIN POWERS #2
K5HP	TERRY	101/38	107/44	127/41	93/31	3/2	431	156	67,236	TCG RUMBA
KC5YKX	REID	75/33	103/42	112/39	79/34	32/17	401	165	66,165	AUSTIN POWRS #1
NA5U	MICHAEL	95/37	104/39	110/39	98/38	6/4	413	157	64,841	
KE5OG	BILL	38/26	68/36	145/45	110/45	19/10	380	162	61,560	
WA0SXV	MIKE	85/35	105/43	86/37	54/18	1/1	331	134	44,354	
KU5S	**JIM**	**88/39**	**89/38**	**72/35**	**46/22**	**6/3**	**301**	**137**	**41,237**	
NT5TU	AGGIE	20/13	88/37	148/40	59/29	11/6	326	125	40,750	AUSTIN POWERS #1
K5WAF	BILL	62/30	73/31	97/39	49/24	22/10	303	134	40,602	
KS5V	ED	64/27	126/42	100/35	26/19	0/0	316	123	38,868	AUSTIN POWERS #1
W5MK	CHRIS	56/31	83/32	123/36	40/18	3/1	305	118	35,990	
NI5F	BILL	35/23	43/27	99/37	41/21	14/4	232	112	25,984	
K5WW	GERT	21/17	66/33	75/37	48/28	5/4	215	119	25,585	
AD6G	FRITZ	0/0	78/37	70/35	49/28	4/3	201	103	20,703	
N5LBJ	**DOUG**	**42/28**	**30/18**	**52/23**	**41/13**	**12/8**	**177**	**90**	**15,930**	
N5NJ	BOB	57/32	73/35	14/10	0/0	0/0	144	77	11,088	
N5PA	ALAN	0/0	42/36	51/26	22/12	0/0	115	64	7360	
N5BA	BRIAN	8/7	23/17	5/5	7/6	0/0	43	35	1505	
W5BBR	**BILL**	**3/3**	**10/8**	**16/11**	**7/5**	**0/0**	**36**	**27**	**972**	
K5EJL	JOE	0/0	0/0	11/6	9/8	2/2	22	16	352	
AD6WL	JIM	63/31	108/43	176/50	121/45	63/26	531	195	103,545	TCG WALTZ
WØYK	ED	72/38	105/48	105/43	102/45	56/22	440	196	86,240	NCCC #1
K6RIM	AL	59/30	110/45	123/42	91/34	48/25	431	177	76,287	NCCC #1
N6OJ	**CHUCK**	**36/22**	**124/41**	**152/47**	**121/39**	**23/15**	**456**	**164**	**74,784**	
KK6T	TERRY	23/13	117/42	138/48	81/36	25/16	384	155	59,520	
ND2T	TOM	42/18	39/22	140/45	141/42	33/20	395	147	58,065	NCCC #2
N6PC	PAUL	83/36	81/36	127/45	73/30	0/0	364	147	53,508	
KJ6RA	RICH	77/32	85/36	55/29	26/16	16/8	259	121	31,339	NCCC #1
W6WRT	BILL	10/10	69/33	59/26	52/31	13/10	203	110	22,330	
KE6RAD	KEVIN	30/13	61/29	56/30	53/24	9/6	209	102	21,318	

CALL	NAME	80 m	40 m	20 m	15 m	10 m	QSO's	MULTS	SCORE	TEAM
K6EP	ERIC	17/9	41/22	88/37	38/24	10/6	194	98	19,012	
W6ZZZ	**MARK**	**49/17**	**51/26**	**32/23**	**37/23**	**9/6**	**178**	**95**	**16,910**	**NCCC #1**
WA6BOB	**BOB**	**0/0**	**103/49**	**68/33**	**3/3**	**5/4**	**179**	**89**	**15,931**	
AK6DV	CHUCK	72/32	54/30	29/17	0/0	0/0	155	79	12,245	
W6IWO	DALE	0/0	0/0	92/37	77/34	0/0	169	71	11,990	
NC6P	DAVE	26/9	35/21	38/22	40/22	7/4	146	78	11,388	
WK6I	JEFF	62/30	30/24	26/18	0/0	0/0	118	72	8496	NCCC #2
KF6PKG	ANDRE	0/0	4/4	55/29	42/24	0/0	101	57	5757	
N6RCE	KEVIN	0/0	22/18	18/14	33/17	3/2	76	51	3876	NCCC #1
K6OWL	MARK	15/7	45/21	26/15	0/0	0/0	86	43	3698	
N6EE	RON	19/0	29/8	56/26	0/0	0/0	104	34	3536	
WB6TQG	PHIL	0/0	0/0	51/24	3/3	0/0	54	27	1458	
KQ6TW	ALA	0/0	0/0	8/7	8/7	0/0	16	14	224	
KE6QR	GARY	0/0	0/0	17/13	0/0	0/0	17	13	221	
K6LL	DAVE	72/32	164/45	158/48	156/49	81/32	631	206	129,986	SWACC
W7WW	RED	89/36	156/50	186/47	106/47	57/30	594	210	124,740	SWACC
K7WM	WAYNE	102/40	125/49	153/49	108/47	51/27	539	212	114,268	SWACC
N7UVH	**PAT**	**98/39**	**86/38**	**132/35**	**77/30**	**21/13**	**414**	**155**	**64,170**	
WG7Y	**BOB**	**96/38**	**87/34**	**155/44**	**78/28**	**2/1**	**418**	**145**	**60,610**	
W7KB	**RICK**	**61/31**	**60/27**	**151/42**	**86/36**	**20/13**	**378**	**149**	**56,322**	
WY7LL	**LEO**	**61/30**	**107/40**	**145/42**	**67/31**	**0/0**	**380**	**143**	**54,340**	
W6RLL	**JOE**	**39/22**	**36/23**	**120/43**	**82/37**	**30/21**	**307**	**146**	**44,822**	
KW7N	**STEVE**	**75/38**	**70/31**	**88/31**	**59/25**	**19/11**	**311**	**136**	**42,296**	**TCG RUMBA**
WA7VNI	**PAT**	**51/24**	**52/23**	**94/37**	**74/33**	**22/11**	**293**	**128**	**37,504**	
K7GS	GARY	16/11	29/20	127/44	75/31	28/15	275	121	33,275	
K7MM	DAN	44/24	30/20	50/24	117/39	0/0	241	107	25,787	
N7ON	**JOHN**	**35/15**	**40/26**	**84/43**	**36/21**	**20/13**	**215**	**118**	**25,370**	
KJ7NO	BRAD	75/33	50/25	40/20	51/23	8/7	224	108	24,192	
K7VIT	JERRY	31/13	53/29	39/22	18/14	4/4	145	82	11,890	
KR7X	HANK	7/3	22/16	46/20	38/24	0/0	113	63	7119	
WG7X	GARY	3/2	17/14	53/25	29/22	0/0	102	63	6426	
W7DPW	DAVE	0/0	0/0	71/28	16/11	13/8	100	47	4700	
K7KAR	KEITH	0/0	9/5	28/23	20/15	2/2	59	45	2655	
W1ZRV	**WILL**	**0/0**	**0/0**	**15/10**	**0/0**	**0/0**	**15**	**10**	**150**	
WI8W	**THOM**	**103/39**	**149/49**	**119/34**	**58/17**	**18/6**	**447**	**145**	**64,815**	**TCG SAMBA**
K8FC	JOE	153/47	123/46	107/40	43/25	1/1	427	159	67,893	
WG8Y	**MARK**	**71/31**	**71/33**	**99/37**	**63/22**	**16/7**	**320**	**130**	**41,600**	
W8UL	**JOHN**	**80/35**	**85/32**	**83/33**	**41/12**	**15/5**	**304**	**117**	**35,568**	
K8AA	DAVE	129/42	51/28	38/21	19/11	4/4	241	106	25,546	
N8TDL	**GREG**	**51/25**	**63/28**	**57/24**	**30/11**	**13/6**	**214**	**94**	**20,116**	
N2BJ	**BARRY**	**54/28**	**45/23**	**35/20**	**25/14**	**10/4**	**169**	**89**	**15,041**	
WA8SDA	**FRANCIS**	**0/0**	**72/31**	**0/0**	**17/9**	**14/8**	**103**	**48**	**4944**	
NU8Z	**MARK**	**30/21**	**13/11**	**30/16**	**6/4**	**1/1**	**80**	**53**	**4240**	
AB8ND	JACK	0/0	2/2	14/11	5/3	2/1	23	17	391	
AI9T	STEVE	134/44	121/46	114/39	59/21	25/12	453	162	73,386	TCG TANGO
KE9S	JEFF	91/41	142/47	142/40	81/21	8/2	464	151	70,064	
K9JS	JON	82/41	149/46	68/31	56/14	10/3	365	135	49,275	SMC#1
K9WX	TIM	72/39	101/37	122/38	41/16	14/3	350	133	46,550	SMC#1
W9HLY	**VERN**	**87/34**	**87/37**	**106/33**	**60/19**	**17/7**	**357**	**130**	**46,410**	
N9KO	**CALVIN**	**34/24**	**83/39**	**66/26**	**37/14**	**15/5**	**235**	**108**	**25,380**	**TCG CHARLESTON**
K9MI	**MIKE**	**77/30**	**58/26**	**27/17**	**15/9**	**6/2**	**183**	**84**	**15,372**	**TCG CHARLESTON**
WD9GMK	**ALAN**	**0/0**	**85/36**	**72/27**	**18/8**	**0/0**	**175**	**71**	**12,425**	
WE9V	**CHAD**	**0/0**	**0/0**	**85/32**	**48/13**	**20/10**	**153**	**55**	**8316**	**SMC#1**
KB9DVC	GEHL	59/33	28/15	14/11	0/0	0/0	101	59	5959	
NØICV	TONY	18/17	31/22	14/13	11/6	13/5	87	63	5481	
W9ISC	JOHN	5/5	19/13	22/10	21/10	0/0	67	38	2546	
N5UWY/9	PETER	53/30	4/3	0/0	0/0	0/0	57	33	1881	
AH6HH	SID	0/0	41/21	26/15	30/17	2/2	99	55	5445	
KL7IWC	LARRY	17/10	13/6	1/1	0/0	0/0	31	17	527	
VE1OP	SCOTT	63/33	100/43	186/46	71/28	16/7	436	157	68,452	TCG TANGO
VE2FK	CLAUDE	68/36	79/33	46/22	17/9	0/0	210	100	21,000	
VE2OWL	STEF	0/0	0/0	14/11	27/16	0/0	41	27	1107	
VE3GSI	ERIC	80/37	77/35	124/40	68/19	11/8	360	139	50,040	CC ONTARIO
VA3PC	**PAUL**	**95/38**	**81/32**	**73/30**	**63/19**	**18/5**	**330**	**124**	**40,920**	**CC ONTARIO**
VE3HG	PETER	53/28	70/34	62/26	46/15	10/6	241	109	26,269	CC ONTARIO
VE3UKR	NICK	0/0	0/0	58/22	35/12	5/4	98	38	3724	
VA3KGB	CHIP	3/3	14/13	21/11	0/0	0/0	38	27	1026	
VE6YR	BOB	39/19	86/36	81/36	84/35	12/8	302	134	40,468	
*WB5EXI/ VE6	CHARLES	0/0	5/4	18/10	0/0	0/0	23	14	322	
VA7AM	DAVE	17/12	111/44	124/36	102/37	26/16	380	145	55,100	
VE7FO	OJ	24/15	37/22	175/45	54/24	32/18	322	124	39,928	
VA7ST	BUD	63/30	47/22	86/35	15/11	7/2	218	100	21,800	
VE9DX	ANDY	5/5	57/30	99/32	10/8	0/0	171	75	12,825	
KP4JRS	JOSE	0/0	0/0	69/26	0/0	0/0	69	26	1794	
NP4BM	VICTOR	9/9	24/16	0/0	8/6	1/1	42	32	1344	
XE1XOE	MIGUEL	0/0	16/7	80/37	50/28	25/10	171	82	14,022	
DX STATIONS										
YV6BTF	JOSE	1/1	123/42	148/43	44/23	54/27	370	136	50,320	
PY2SRB	SILVIO	0/0	0/0	0/0	43/27	67/60	110	60	6600	
ON6LEO	LEO	0/0	5/5	54/29	0/0	0/0	59	34	2006	
OK2BXW	JAROMIR	0/0	0/0	26/20	16/13	0/0	42	33	1386	
HB9BJJ	ROY	5/5	41/23	0/0	0/0	0/0	46	28	1288	
MØCFV	BLAZEJ	0/0	0/0	12/10	21/16	0/0	33	26	858	
DL1ZBO	RAY	0/0	9/8	9/8	6/5	0/0	24	21	504	
JA1BWA	TOSHI	0/0	0/0	17/10	10/5	0/0	27	15	405	
7L4IOU	HISA	0/0	0/0	13/8	10/5	0/0	23	13	299	
JA1BHK	MASA	0/0	0/0	9/8	5/2	0/0	14	10	140	
DK8EY	CHRISTOPH		0/0	13/8	0/0	0/0	0/0	13	8	104
JA1XRH	TAK	0/0	0/0	8/5	6/2	0/0	14	7	98	
JA7KM	YASU	0/0	0/0	2/2	10/5	0/0	12	7	84	
YC2ECG	JON	0/0	0/0	0/0	15/5	0/0	15	5	75	
JA3MIB	TOYO	0/0	0/0	0/0	5/4	0/0	5	4	20	
YU7AM	ARPAD	0/0	0/0	5/4	0/0	0/0	5	4	20	
MULTI-TWO										
W6YX	JOHN	130/46	216/56	198/52	207/51	117/37	868	242	210,056	
W5KFT	ED	169/48	225/57	226/49	158/45	34/16	812	215	174,580	
NN6NN	DOC	136/43	194/57	201/51	158/49	69/27	758	227	172,066	
NØNI	**BOB**	**178/50**	**218/52**	**229/48**	**118/41**	**18/11**	**761**	**202**	**153,722**	

*DENOTES QRP **

MULTI-2 OPERATORS:
W6YX—K6UFO, N6DE, N7MH, W6LD, W6GEM
W5KFT—K5PI, K5TWJ
NN6NN—W6XK, N6EE
NØNI—NØNI, NØAC, WØETC

Results, February 2004 Phone Sprint

Jim Stevens, K4MA
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This was the forty-third Phone Sprint, and a record 156 logs were received. Compared to a year ago, scores were very similar, thanks to the offsetting effect of more QSOs but less multipliers. For the first time in several Sprints, there were no DX logs submitted. In reading the HP and LP Top Ten listings, you will see a few changes. First, I have added error percentages. The error percentages show two different numbers: first is the *you* rate which is the error rate for that station's log and second is the *them* error rate which reports the percentages of busts of that station's info in another station's log. Additionally, I added *QSOs Lost* and hour-by-hour QSO totals for the LP Top Ten. Finally, I have added a new Top Ten *stat* category for those people who had no busted QSOs in other people's logs. I have dubbed this new stat as *Reverse Golden Logs*.

High Power

K9PG (at WB9Z) notched his third victory. In doing so, Paul became only the second operator to surpass 400 QSOs in a Sprint. Paul has seemingly become Mr. February SSB Sprint, winning the last three February events. Kudos should also go to station owner Jerry, WB9Z, who has built a FB station that Paul has definitely figured out how to pilot in a Sprint.

Coming in second was one of the all time great SSB Sprinters who had been missing for a few years—VA7RR. Welcome back, Gary! Rounding out the HP Top Ten were K4XS, W7WA, W9RE, K6LL, KW8N, N9RV, K9NW, and KA9FOX. Congratulations to Dave, K6LL, who became the second person to notch 30 or more Top Ten finishes in SSB Sprint. Also Dan, W7WA, notched his 20th Top Ten finish.

Low Power

In the closest race of this Sprint, K5NZ edged K7SV for the LP crown by only 36 points. Mike had 18 more QSOs than Larry, which barely made up for Larry's 3 extra multipliers. It was Mike's fourth LP win while no one else has won more than one. Rounding out the LP Top Ten were a lot of the usual suspects with some newcomers thrown in. In order: N5DO, K6ZH, KU8E, N4LR, AC0W, NA4K, KL2A, and WA4PGM.

QRP

Pat, N8VW, became the first multiple winner in the QRP category. The remaining QRP scores are: WB6BWZ, WA4FIB, and K0USN (WV7T).

Golden Logs

The Top Ten Golden Logs were KI7Y, N6MJ, W4OC, K8MR, N4GI, KJ9C, N6RT, N0ICV, and N4NTO. For the first time, here is the list of Top Ten Reverse Golden Logs (meaning there were no busts of these stations' sent info in the

TOP 10 QSOS

K9PG (@WB9Z)	411
VA7RR	358
W7WA	354
W9RE	349
N9RV	348
KW8N	334
K4XS	333
K6LL	332
K9NW	322
KA9FOX	307

TOP 10 MULTS

K4XS	48
VA7RR	47
W7EJ	47
K7SV	47
K9PG (@WB9Z)	46
K6LL	46
K9ZO	46
W6YX (N6DE)	46
K9NW	45
KA9FOX	45
K7RI (K7SS)	45
NX9T	45
W7WW	45

TOP 10 QRP

N8VW	6806
WB6BWZ	368
WA4FIB	198
K0USN (WV7T)	135

TOP 10 GOLDEN

KI7Y	132
N6MJ	120
W4OC	103
K8MR	69
N4GI	58
KJ9C	51
N6RT	47
N0ICV	10
N4NTO	7

TOP 10 REVERSE GOLDEN

W4NZ	233
W8TM	116
K1NQ	111
NB7V	62
K6OWL	57
N6RT	47
NY3A	41
VE3UDK	27
W4OGG	17

TOP 10 Band Changes

N9RV	125
K9PG (@WB9Z)	90
KW8N	87
K9ZO	54
K5NZ	51
AC0W	40
W5AC (NT5TU)	34
W9RE	32
W5WMU	30
K4MA	28
KT0R	28

TEAM SCORES

Dead Lizards CAN Talk		*NCCC #1*		*SCCC #1*		*Side Pocket Sprinter*	
K9PG (@WB9Z)	18,906	VA7RR	16,826	K6LL	15,272	W7WA	15,576
W9RE	15,356	W6YX (N6DE)	13,064	K6LA	12,814	W7EJ	13,630
KW8N	14,696	W0YK	11,280	W6CIT (N6AN)	11,088	K7RI (K7SS)	13,455
N9RV	14,616	K6IF	10,248	K6ZH	10,062	N7LOX	10,701
K9NW	14,490	K6LRN	9282	W7WW	9900	KL2A	7960
KA9FOX	13,815	WX5S (@N6RO)	9030	W6TK	9711	N9ADG	6401
K9ZO	13,064	WK6I	7215	N6MJ	4440	KI7Y	4224
NX9T	12,420	N6ZFO	6847	K6EY	4004	KL1V	2070
K0OU	11,137	W6IXP	6760	WA7BNM	3180		74017
WA9IRV	9360	ND2T	4020		80,471		
	137,860		94,572				

5. Southeast Sprint Coalition: WC4E, K7SV, K4MA, KU8E, WA4PGM, N4CW, N8VW, K4NO, WB6BWZ ..... 68,548.
6. TCG TITANS: K4WX, W5TM, K4BP, W4NZ, NA4K, N4DW, W9WI, K4RO, K0EJ ..... 59,921.
7. NCCC #2: K6XX, K6III, KJ6RA, W6OAT, W6FRH, K6UFO, K6VVA, KE6QR, W6ZZZ ..... 41,314.
8. YCCC: KK1L, K5ZD, K1NQ, KE1FO, AJ1M ..... 22,253.
9. MWA # 1: AC0W, KT0R, WG0M, N0AT ..... 20,796.
10. NCCC #3: W6XU, KE6ZSN, K6ST, W7SW, N6AJR, NU6T, K6BBQ, AK6DV, WA4FIB ..... 20,534.
11. Grand Mesa: KO7X, N0KE, W0ETT, N0SXX, KI0GQ, K0USN ..... 17,859.
12. SCCC #2: W4EF, K6ZCL, N6RT ..... 15,658.

TOP 10 LOW PWR	LOST	QSOs YOU	ERROR RATES THEM		00Z	01Z	02Z	03Z
K5NZ	11880	5	1.8%	1.5%	79	75	55	61
K7SV	11844	3	1.2%	2.4%	84	64	48	56
N5DO	10290	3	1.2%	3.7%	80	67	47	51
K6ZH	10062	4	1.7%	0.9%	58	53	63	60
KU8E	90405	1.7%	2.2%	75	57	40	55	
N4LR	90303	1.4%	1.9%	68	48	42	57	
AC0W	8680	2	0.9%	1.4%	63	64	46	44
NA4K	84056	1.9%	0.5%	76	38	49	44	
KL2A	79607	2.9%	3.5%	74	54	34	38	
WA4PGM	76803	1.5%	3.1%	62	41	41	48	

TOP 10 SCORES		*BAND CHANGES*	*QSOs LOST*	*ERROR RATES YOU*	*THEM*	*00Z*	*01Z*	*02Z*	*03Z*
K9PG (@WB9Z)	18906	90	2	0.5%	4.1%	120	102	81	108
VA7RR	16826	2	3	0.6%	3.3%	100	76	98	85
K4XS	15984	4	3	0.9%	1.2%	84	73	89	87
W7WA	15576	4	7	1.9%	1.4%	104	72	89	89
W9RE	15356	32	5	0.8%	3.7%	98	79	90	84
K6LL	15272	2	10	2.9%	2.7%	88	81	75	88
KW8N	14696	87	8	1.8%	3.0%	95	89	67	85
N9RV	14616	125	8	2.0%	5.4%	103	80	78	88
K9NW	14490	13	6	1.5%	7.7%	107	79	67	70
KA9FOX	13815	5	12	3.4%	2.6%	100	74	60	74

receiving station's log): W4NZ, W8TM, K1NQ, NB7V, K6OWL, N6RT, NY3A, VE3UDK, and W4OGG. Congratulations on the accuracy! If you want a copy of your log checking report, please send an e-mail to **ssbsprint@ncjweb.com**.

Records

There were no new high power area records this time. New low power area records are from K1NQ in Vermont, AJ1M in Rhode Island, K7SV in Virginia, KU8E in Georgia, NB7V in Montana, and ACØW in Minnesota. A new QRP record was established by KØUSN (WV7T) in Colorado. The Phone Sprint records will soon be updated on the *NCJ* Web. Check them out at **www.ncjweb.com/ssbsprintrecords.php**.

Teams

In the team competition, Dead Lizards CAN Talk picked up yet another win with NCCC #1 coming in second. Dead Lizards has now won five out of the last six team competitions. Rounding out the Top Five teams were—SCCC #1, Side Pocket Sprinters, and Southeast Sprint Coalition.

Notes

The September 2004 Phone Sprint will be held at 0000Z on September 19 (September 18 local time). Get on and join us in the fun!

Soapbox

This is my *last* Low-Power SSB Contest with no beam—K6VVA! Thanks for all the fun. I still need to figure out how *not* to get stuck hitting those "brick walls" that show up—NX9T! First time—man what a blast! Had some RF getting back into the mic, but had a great time. I *will* be back from Kansas—KØXM (*we sure hope so for that mult—editor*). I just happened to be installing a new FT-897 into my truck and low and behold the Sprint was going on. All contacts were made from the truck with 100 W and the ATAS 120 antenna. Thanks to all who dug out my weak signal! It was great to hear so many familiar calls. Building a new station in Colorado and Montana—WØMU. Nice to work K7RAT on phone—W6CIT! Condx on 20 much different than the cw event. Good signals from the West Coast and sporadic E for the closer stuff made 20 my best band. It's still a little frustrating to get beat out by the high power guys, but a lot of fun none-the-less—K7SV. Fun and only dipoles here with a couple hundred watts—W7SW. Last contest from this QTH. Moving to new QTH in two weeks—KA9FOX. Lotsa easy mults never heard like ME, NJ, and NM. Did work three AK stations—KØOU. My first SSB Sprint. Had a good time once I got into a rhythm—KE1FO. Because of the impending wedding of #1 daughter, I had to multiplex operating with painting the living room (single op, two brushes)—N6ER. Wish I could type—K4BP! My idea of hell is being forced to operate 75 in a SSB Sprint—N9RV.

Call	*Name*	*QTH*	*20*	*40*	*80*	*QSO*	*Mlt*	*Score*	*Team*
KK1L	RON	VT	89	86	64	239	41	9799	YCCC
WB1GQR (W1SJ)	MITCH	VT	83	47	66	196	40	7840	
W1EQ	*BOB	CT	61	38	42	141	37	5217	
K5ZD	RANDY	MA	110	42	0	152	30	4560	YCCC
K1NQ	*DAVE	NH	49	37	25	111	29	3219	YCCC
KE1FO	*AL	VT	38	21	36	95	33	3135	YCCC
WG1Z	*JOE	MA	16	34	10	60	28	1680	
AJ1M	*JAY	RI	17	15	23	55	28	1540	YCCC
N1DS	*DENNIS	MA	7	4	0	11	9	99	
W2EQ	*TOM	NJ	27	28	0	75	24	1800	
AJ3M	MASA	MD	5	7	42	134	35	4690	
NY3A	STEVE	PA	0	0	41	41	23	943	
K4XS	BILL	FL	204	71	58	333	48	15984	
WC4E	JEFF	FL	125	99	71	295	44	2980	SOUTHEAST SPRINT
NX9T	JEFF	NC	120	90	66	276	45	12,420	DEAD LIZARDS
K7SV	*LARRY	VA	102	88	62	252	47	11,844	SOUTHEAST SPRINT
K4WX	DON	TN	100	104	75	279	41	11,439	TCG TITANS
K4MA	JIM	NC	79	99	62	240	41	9840	SOUTHEAST SPRINT
W4NF	JACK	VA	66	87	73	226	42	9492	
K4BP	ED	TN	102	87	57	246	38	9348	TCG TITANS
W4NZ	TED	TN	89	79	65	233	39	9087	TCG TITANS
KU8E	*JEFF	GA	97	70	59	226	40	9040	SOUTHEAST SPRINT
N4LR	*DON	GA	104	54	57	215	42	9030	
N4PN	PAUL	GA	113	48	50	211	40	8440	
NA4K	*STEVE	TN	86	57	62	205	41	8405	TCG TITANS
WA4PGM	*KYLE	VA	80	50	62	192	40	7680	SOUTHEAST SPRINT
N4CW	BERT	NC	95	67	33	195	38	7410	SOUTHEAST SPRINT
K4AMC	JIM	TN	73	48	59	180	40	7200	
NA4BW	BRIAN	GA	53	60	49	162	36	5832	
KT4Q	*STEVE	GA	88	13	36	137	38	5206	
N4DW	DAVE	TN	68	31	32	131	35	4585	TCG TITANS
W9WI	DOUG	TN	63	40	20	123	30	3690	TCG TITANS
W4OC	*DON	SC	0	48	55	103	33	3399	
K4NO	GREG	AL	19	9	58	86	30	2580	SOUTHEAST SPRINT
W4AU	*JOHN	VA	38	27	0	65	23	1495	
K4RO	KIRK	TN	7	0	48	55	27	1485	TCG TITANS
N4GI	BLAKE	FL	30	11	17	58	22	1276	
KØEJ	*MARK	TN	38	19	0	57	20	1140	TCG TITANS
WB6BWZ	**MATT	GA	20	0	0	29	11	319	
KI4ASK	*JOE	GA	18	0	1	19	15	285	
W4OGG	DAVE	TN	17	0	0	17	12	204	
N4NTO	*TRIPP	NC	0	7	0	7	5	35	
W5WMU	PAT	LA	122	88	73	283	43	12,169	
K5NZ	*MIKE	TX	132	92	46	270	44	11,880	
W5TM (W5AO)	DAVE	OK	80	95	87	262	41	10,742	TCG TITANS
N5DO	*DAVE	TX	111	73	61	245	42	10,290	
K5XR (W5ASP)	JOE	TX	101	76	62	239	39	9321	
K5YAA	JERRY	OK	77	76	39	192	40	7680	
W5GN	BARRY	TX	88	59	38	185	39	7215	
KE5OG	*BILL	TX	90	21	26	137	35	4795	
W5AC (NT5TU)	*AGGIE	TX	92	33	0	125	35	4375	
W2MN	*TOM	TX	51	20	7	78	27	2106	
KD5JXM	*ZAK	MS	50	7	0	57	23	1311	
W6YX (N6DE)	BILL	CA	127	98	59	284	46	13,064	NCCC #1
K6LA	KEN	CA	143	98	57	298	43	12,814	SCCC #1
W4EF	MIKE	CA	114	121	67	302	42	12,684	SCCC #2
WØYK	ED	CA	103	106	73	282	40	11,280	NCCC #1
W6CIT (N6AN)	REX	CA	134	75	43	252	44	11,088	SCCC #1
K6XX	BOB	CA	115	73	59	247	42	10,374	NCCC #2
K6IF	DAN	CA	114	77	53	244	42	10,248	NCCC #1
K6ZH	*JIM	CA	102	84	48	234	43	10,062	SCCC #1
W6TK	DICK	CA	04	83	62	249	39	9711	SCCC #1
K6LRN	DICK	CA	88	81	52	221	42	9282	NCCC #1
WX5S (@N6RO)	MATT	CA	102	66	47	215	42	9030	NCCC #1
K6III	ROMEO	CA	104	38	42	184	40	7360	NCCC #2
WK6I	JEFF	CA	101	38	46	185	39	7215	NCCC #1
N6ZFO	*BILL	CA	72	51	44	167	41	6847	NCCC #1
W6IXP	TOM	CA	68	51	50	169	40	6760	NCCC #1
KJ6RA	RICH	CA	61	81	53	195	34	6630	NCCC #2
W6XU	JOSH	CA	73	53	3	149	37	5513	NCCC #3
W6OAT	*RUSTY	CA	90	49	0	139	36	5004	NCCC #2
KE6ZSN	JOHN	CA	76	23	37	136	35	4760	NCCC #3
W6FRH	BOB	CA	61	38	34	133	34	4522	NCCC #2
K6ST	BARRY	CA	66	41	32	39	32	4448	NCCC #3
N6MJ	*DAN	CA	97	23	0	120	37	4440	SCCC #1
KQ6RL	DAVE	CA	52	29	51	132	33	4356	
ND2T	*TOM	CA	70	25	39	134	30	4020	NCCC #1
K6EY	*BECKY	CA	47	66	30	143	28	4004	SCCC #1
N6ER	KEVIN	CA	40	55	41	136	26	3536	
WA7BNM	*BRUCE	CA	15	83	8	106	30	3180	SCCC #1
K6UFO	*MORK	CA	53	29	33	115	25	2875	NCCC #2
K6VVA	*RICK	CA	31	30	37	98	26	2548	NCCC #2
W7SW	SCOTTY	CA	56	13	23	92	27	2484	NCCC #3
K6ZCL	*TED	CA	45	36	20	101	22	2222	SCCC #2
N6AJR	*TOM	CA	33	16	19	68	25	1700	NCCC #3
KE6QR	*GARY	CA	30	21	17	68	24	1632	NCCC #2
NO6X	KEN	CA	29	28	0	57	24	1368	
K6OWL	*MARK	CA	9	28	20	57	14	798	
N6RT	*DOUG	CA	24	10	13	47	16	752	SCCC #2
NU6T	RICH	CA	6	19	12	37	15	555	NCCC #3
K6BBQ (@W6SG)	*REM	CA	14	14	12	40	12	480	NCCC #3
AK6DV	*CHUCK	CA	22	0	0	22	18	396	NCCC #3
W6ZZZ	*MARK	CA	8	11	22	41	9	369	NCCC #2
WA4FIB	**JACK	CA	6	13	14	33	6	198	NCCC #3
K6CSL	BERT	CA	10	10	0	20	9	180	

Call	Name	QTH	20	40	80	QSO	Mlt	Score	Team
W7WA	DAN	WA	170	112	72	354	44	15,576	SIDE POCKET SPRINTER
K6LL	DAVE	AZ	140	108	84	32	46	15,272	SCCC #1
W7EJ	JIM	OR	104	127	59	290	47	13,630	SIDE POCKET SPRINTER
K7RI (K7SS)	DAN	WA	132	96	71	299	45	13,455	SIDE POCKET SPRINTER
N7LOX	BRIAN	WA	97	100	64	261	41	10,701	SIDE POCKET SPRINTER
W7WW	DAVE	AZ	105	71	44	220	45	9900	SCCC #1
KL2A	*JOHN	WA	107	56	36	199	40	7960	SIDE POCKET SPRINTER
N9ADG	*BRIAN	WA	71	59	43	173	37	401	SIDE POCKET SPRINTER
W7ZB	*MARK	OR	76	32	54	162	37	5994	
KO7X	*ALAN	WY	93	57	10	160	31	4960	GRAND MESA
KI7Y	*JIM	OR	84	30	18	132	32	4224	SIDE POCKET SPRINTER
K9JF	JIM	WA	92	23	0	115	35	4025	
AL1G	KIM	AK	93	23	8	124	28	3472	
N7WA	*MIKE	WA	56	27	19	102	33	3366	
KL1V	KENT	AK	69	0	21	90	23	2070	SIDE POCKET SPRINTER
NB7V	*DAVE	MT	24	26	12	62	22	1364	
KW8N	BOB	OH	133	129	72	334	44	14,696	DEAD LIZARDS
N8VW	**PAT	OH	56	55	5	166	41	6806	SOUTHEAST SPRINT COA
N8AA	*JOHN	OH	37	6	49	142	37	5254	
W8TM	*PAUL	OH	43	49	24	16	33	3828	
KA8HQL	*JEFF	OH	42	54	12	108	31	3348	
K8MR	LEBRON	OH	0	0	69	69	34	2346	
K9PG (@WB9Z)	PAUL	IL	151	162	98	411	46	18,906	DEAD LIZARDS
W9RE	MIKE	IN	131	118	100	349	44	15,356	DEAD LIZARDS
N9RV	PAT	IN	132	134	82	348	42	14,616	DEAD LIZARDS
K9NW	MIKE	IN	134	101	87	322	45	14,490	DEAD LIZARDS
KA9FOX	SCOTT	WI	112	96	99	307	45	13,815	DEAD LIZARDS
K9ZO	CAT	IL	102	103	79	284	46	13,064	DEAD LIZARDS
K9JS	JOHN	IL	93	84	56	233	44	10,252	
WA9IRV	RON	WI	77	98	65	240	39	9360	DEAD LIZARDS

Call	Name	QTH	20	40	80	QSO	Mlt	Score	Team
WI9WI	JIM	WI	59	89	61	209	42	8778	
K9SG	DOC	IN	55	70	38	163	37	6031	
KX9DX	RICK	IL	52	38	38	128	32	4096	
AA9RT	*LOU	IL	49	44	27	120	28	3360	
N9KT	*DAVID	IN	32	48	18	98	31	3038	
W9GIG	DICK	IL	38	23	2	63	27	1701	
KJ9C	MEL	IN	0	27	24	51	23	1173	
NØICV	*TONY	IL	10	0	0	10	9	90	
KØOU	STEVE	MO	98	94	67	259	43	11,137	DEAD LIZARDS
AC0W	*BILL	MN	90	87	40	217	40	8680	MWA # 1
KTØR	DAVE	MN	50	81	59	190	43	8170	MWA # 1
KØXM	*CHUCK	KS	70	57	40	167	37	6179	
KØHW	*JIM	SD	61	60	25	146	38	5548	
NØKE	*PHIL	CO	96	14	15	125	35	4375	GRAND MESA
WØETT	*KEN	CO	71	31	10	112	36	4032	GRAND MESA
NØSXX	*GARY	CO	80	52	3	135	29	3915	GRAND MESA
WGØM	*MIKE	MN	43	24	2	69	30	2070	MWA # 1
NØAT	*RON	MN	0	34	33	67	28	1876	MWA # 1
N4VI	*CHRIS	CO	18	40	0	58	26	1508	
WØMU	*MIKE	CO	33	40	0	73	20	1460	
WØZP	WAYNE	CO	44	4	0	48	18	864	
KIØGQ	*VAL	CO	19	6	1	26	17	442	GRAND MESA
KØUSN (WV7T)	**CHIEF	CO	5	8	2	15	9	135	GRAND MESA
VA7RR	GARY	VE7	161	124	73	358	47	16,826	NCCC #1
VE4XT	KELLY	VE4	58	85	37	180	36	6480	
VE5SF	*SAM	VE5	87	90	1	178	35	6230	
VA3NR	CHRIS	VE3	59	50	12	121	27	3267	
VE7FO	*JIM	VE7	52	7	23	82	26	2132	
VE3WRC	*GREG	VE3	26	18	4	48	20	960	
VE6JY	*DON	VE6	0	14	15	29	16	464	
VE3UDK	*JOHN	VE3	0	19	8	27	16	432	

February 2004 CW Sprint Results

Boring Amateur Radio Club

The 54th CW Sprint was held on February 1, 2004. Conditions started showing signs of the sunspot decline with few stations lasting more than an hour on 20. Some west coast stations were even heard on 80 meters before the second hour was over. Once again, we saw great activity and set a new high for the number logs received. It was also the third consecutive CW Sprint with a new QSO record with a total over 400 QSOs.

Sadly, it is also the first time that we are forced to declare the winner posthumously.

The high power winner, Bill Fisher, W4AN, operated the CW Sprint with the call sign K4AAA and edged out the competition by a scant QSO after the log checking. Bill's QSO total dropped off a little from his past two efforts and he failed to break 400 for the first time since 2002. However, his multiplier of 52 was enough to overcome the 14 QSO gap and win his fourth consecutive CW Sprint. This has not been done since N5TJ's string of 11 victories over 10 years ago.

Bill unexpectedly passed away on April 4 at the age of 41. We will all miss Bill's snappy CW exchanges during this contest.

Bill was very active encouraging stations with a 4 in their call to try the Sprint. He would typically register four or more teams from the Southeast for each Sprint. The Web site **contesting.com** was one of contributions to the sport, and he put together a Web page that many of you have used to sharpen your skills.

This year, when Bill asked K4OJ if he could be on a Sprint team, Jim was not sure he would be able to, as he had some surgery coming up that had not yet been scheduled. However, as it turned out, Jim was able to participate. Due to the shorter log deadline, we were able to send Jim his Log Check Report the evening before he went to the hospital, just 10 days after the contest. Unfortunately, Jim did not survive the surgery. Jim did get another contest in before the end however, putting in a strong effort in the FOC marathon. His energy and sense of humor are a loss for all of us.

Both of these gentlemen will be missed in the future sprints. In their memory – there will be a voluntary minute of silence at the start of the September 2004 CW Sprint (0000 to 0001 UTC).

And now for the scores…

Top 10 Scores		*Band Changes*	*QSOs Lost*	*00z*	*01z*	*02z*	*03z*
K4AAA	20332	246	8	116	88	107	80
N6TR	20250	200	3	118	104	93	90
K5ZD	19136	60	0	107	90	90	81
N9RV	18772	188	0	100	78	100	83
W6EEN	18500	88	1	102	100	89	79
N2NT	18473	152	0	112	85	90	90
K5TR	18400	164	6	110	82	95	81
W6YX	17368	2	2	89	83	75	87
K6XX	17108	3	1	85	87	70	87
N6MJ	17050	94	3	101	87	77	76

Top 10 QSOS	
N6TR	405
K4AAA	391
N2NT	377
W6EEN	370
K5ZD	368
K5TR	368
N9RV	361
K3LR	342
N6MJ	341
NT1Y	338

Top 10 Low Power	
N6MJ	17050
W6OAT	14560
N5AW	13728
N6AA	13680
N0AX	12737
K7SV	12596
N5DO	12195
NP4Z	12144
NN1N	11564
N7LOX	11520

Golden Logs (No QSOs removed)	
N2NT	377
K5ZD	368
N9RV	361
N5OT	312
N9CK	283
KM4M	265
NØAV	265
K2UA	245
K1HT	218
K4MX	151
KØEJ	102
N4FCG	100
N4VI	84
K1ZZ	22
WB6BWZ	19
K6ZCL	6
N6MZ	1

Top 10 Band Changes	
K4AAA	246
N6TR	200
N9RV	188
K5TR	164
N2NT	152
N3BB	134
NT1Y	132
K5GN	115
AG9A	109
K1EA	99

Top 10 Mults	
N9RV	52
W6OAT	52
K4AAA	52
K5ZD	52
N5AW	52
W6YX	52
K6XX	52
N4OGW	52
K4XU	51
K1KI	51

Top 10 QRP	
KG5U	6888
N8VW	6840
K7UP	6622
NC7J	5145
KX6SUB	3960
N6WG	1836
W8TM	315
K1ZZ	308
K7GS	220
WB6BWZ	190

QRP Top Ten

In the QRP category, we once again filled up a top ten box with one score to spare. Dale, KG5U used to be comfortable as the only QRP entry. He has had a hard time coming out on top with all of the new activity. However, Dale was finally able to scratch his way back on top of the heap. Dale edge out Pat, N8VW and John, K7UP who both had impressive scores only about ten QSOs behind Dale. NC7J came in fourth place, handing out the Utah multiplier to those with good ears. K6III piloted the improbable call sign KX6SUB to a 5th place finish. Congrats again to all 11 of our QRP participants who were brave enough to jump into the fray armed with only 5 W.

Low Power Top Ten

The low power category continues to see stiff competition among those trying to make the top ten box. That would be the low power top ten box, right? Well, perhaps, but this year a standout effort by Dan Craig, N6MJ, took first place low power honors with a record-shattering score that would have also made the top ten in the high power category! While Dan is certainly one of the rising stars in contesting, some credit must be given to Dan's host, W6KP, who has an excellent station at a fantastic location. Sprint father, Rusty, W6OAT came in second place with a very respectable score for a mere mortal. Marv, N5AW, who has been operating sprints forever it seems, put in the 3rd place score—not bad for a five (or at least that's what his team was named). Another Sprint veteran, N6AA, had some amplifier troubles so he operated low power for a change and got close to 300 QSOs anyway. It was great to hear a real effort out of Puerto Rico with NP4Z making the box along with K7SV, NØAX, N5DO, NN1N and N7LOX.

High Power Top Ten

In the high power, mostly multi-transmitter category (SO2R), W4AN won his

Team Scores

NCCC #1		*SSC #1*		*SCCC #1*		*SMC—CAT*	
W6YX	17368	K4AAA	20332	W6EEN	18500	N9RV	18772
K6XX	17108	NT1Y	15886	N6MJ	17050	AG9A	16269
N6RO	16121	N4AF	15648	K6LL	16513	K9NW	16250
AE6Y	15300	K4BAI	13728	N6AN	16500	N9CK	13867
W6OAT	14560	K4RO	13583	AC6T	15850	KO0U	13034
AJ6V	14450	W4OC	12831	K6LA	15239	KA9FOX	11374
K7NV	13965	K7SV	12596	W6JPL	14950	K9AY	11319
W6EU	13821	K4NNN	12267	N6HC	9823	K9ZO	9045
W6RGG	13250	K4WX	11956	W6MVW	7869	WT9U	8580
NI6T	11924	K5KG	11790	K6XT	4800	WE9V	6248
	147867		140617		137094		124758

5. SSC #2 (N4OGW, KZ5D, K4BP, NP4Z, KU8E, W5WMU, K4FXN, W9WI, AA4GA, K4IQJ) 112561
6. NCC #1 (N2NT, K3LR, W2RQ, K8AZ, K2UA, W8KIC, KL7WV, W8CAR, WW3S) 96447
7. Corner Pocket (N6TR, K4XU, NØAX, N7LOX, N7WA, KI7Y, W7ZRC, AL1G) 88051
8. FRC & PVRC (K3NM, K3MM, AA3B, K3WW, N8NA, K3MD, N2ED, N3AD) 86435
9. YCCC #1 (K5ZD, K1KI, NN1N, K1HT, N2GC, K2KQ, N1XS, W1JQ, K1ZZ) 83367
10. SSC #3 (K4NO, KM4M, W4NZ, K4AMC, N4ZR, N4CW, W1MO, K4MA, N4FCG, N9GG) 82475
11. Not bad for a five (K5TR, K5GN, N5AW, WQ5L, N5DX, KT5V, NO5W) 77016
12. Austin Powers (N3BB, K5WA, N5DO, K5AF, NT5TU, W5ZL, KG5U, K5IID) 73899
13. NCCC #2 (WØYK, N6ZFO, K6LRN, N6PN, WX5S, K6SRZ, ND2T, W6IXP, K6DGW) 67263
14. CCO (VE3EJ, VE3DZ, VA3NR, VE3JM, VO1AU, VE3IAY, VE3KP, VE3RZ, VE3KZ) 53605
15. Azen #2 (K5YAA, KY7M, N6ZZ, W7YS, K5HP) 47822
16. SSC #4 (N4OX, W3EF, WA4TT, K4MX, W0UCE, W4SAA, K4GA, W4ZW) 43342
17. Azen #1 (N5OT, KC7V, K5KA, K7UP) 42492
18. SCCC #2 (N6AA, K6NR, XE2MX, K6EY, N6PE, K6ZCL) 37891
19. Colo Contesters (KO7X, WØETT, NØSXX, N4VI, WØNT, KØRI) 30111
20. SMC (WI9WI, KE9I, K9KM) 27120
21. YCCC #2 (K1EA, K2LE, K1NQ, W1EBI, AJ1M) 25088
22. QSYers (W5GN, W5DDX, NS3T, KC3M, KS1F) 17127
23. YCCC #3 (K1DG) 15408
24. NCCC #3 (KX6SUB, K6UFO, K6VVA, N6WG) 11567
25. SSC #5 (AE4Y, W4ATL, AA4LR, WB6BWZ) 10230

Guest Ops

K5PTC (N1LN)
KL7WV (W3YQ)
KM4M (K9GY at K4JA)
KO0U (KØOU)
KX6SUB (K6III)
N4FCG (N4BP)
N5TW (KE5C)
WE9V (K9PG)
WX5S (WX5S at AD6E)
W6JPL (W4EF)
W6RGG (W6RGG at W6CS)
K5TR (N5RZ)
W6EEN (N6RT)
AC6T (AC6T at N6VR)
K4BP (NA4K)
NT1Y (W4PA)
W6YX (N7MH)
N6MJ (N6MJ at W6KP)
K8AZ (N8AA)
XE2MX (N6KI)
K3NM (N2NC)
W5DDX (K1DW)

ninth CW Sprint by edging out Tree, N6TR, by a QSO and a half. Tree did manage to finally break in to the "Page Nine" club by ending up with 405 QSOs, a new CW Sprint record. Randy, K5ZD, pushed himself back into the top ten with a convincing effort well ahead of the pack and Pat, N9RV, continued to make everyone wonder what he greases his antennas with to overcome his QTH in the "black hole". N6RT (at W6EEN), N2NT and N5RZ (at K5TR) filled out the middle of the top ten. In 8th and 9th place, we find two newcomers to the top ten: N7MH (operating at W6YX) and K6XX. These two gentlemen had only five band changes between them. K1KI sneaks into the top ten on a technicality since N6MJ did beat his score with low power. Tom also appears to be using a single transmitter as he "only" had 26 band changes. We should mention Scott, W4PA, who found himself in the Northeast for the Sprint due to our date change to avoid Valentine's Day. Scott made the best lemonade he could by operating from NT1Y in Vermont and set a new record there. He posted the 10th highest QSO total but didn't make the box for the first time in forever due to his lower than average multiplier. Scott has already reserved his spot in the next top ten, so the new members shouldn't get too comfortable.

Team Competition

The Northern California Contest Club put together a strong effort without any of the top scores and outdistanced the Southern Sprint Collation for their second Sprint team victory. The SCCC followed in third place with SMC-CAT and team two from the SSC also posting total scores over 100K. A total of 25 teams submitted scores and we thank all of you who organized, and participated on a team.

Golden Logs

Due to the high percentage of participants who send in their logs, and the quality of the exchanges, the CW Sprint is one of the toughest contests to get away with a logging error. For example, in the N6TR log, 99.5 percent of the calls/names and locations are verified. Another 80.7 percent of the QSOs were crosschecked to verify that they were in the other log and the received QSO number was correct. No fewer than 17 stations produced logs that had no score reductions and three of them were in the top ten. With the possible exception of N6MZ who only made one QSO (what's up with that?), you should all be very proud. K5ZD had his second consecutive golden log, which means he now has a running total of 738 perfect QSOs.

A new process was developed to automate the process of sending your log check report via e-mail. However, if you did not receive your report, you can still ask for one from **treeatkkn.net**.

Records

Once again, despite the shorter log deadline, we have set a new record for the number of logs received: 225. This is a substantial increase over the 206 logs we received just last September. Your support of this new concept is greatly appreciated.

In Vermont, W4PA piloted NT1Y to a new record, beating the one established by K1EA just last September. K4NO improved his Alabama record by adding seven QSOs and a multiplier. Tim, NP4Z, submitted the first serious effort from KP4, bettering his mark from February 2002.

Tree, N6TR, set a new QSO record with 405 QSOs, edging out the 404 mark that W4AN established last September. Dan, N6MJ, pummeled the low power record that was previously held by Dan, K7SS, from K7RI. The record of seventeen golden logs was set last September and was matched this time.

Next Time

The next *NCJ* CW Sprint will be held on September 12 UTC. Remember the minute of silence at the start. For team registration, use the *NCJ* Web page at **www.ncjweb.com**. Logs are submitted via e-mail to **cwsprintatkkn.net** and are due seven days after the contest.

Soapbox

Conditions were terrible on 20M, but rest of the bands were fine. Missed KY as well.—K4FXN

Worst conditions I've seen for a Sprint. 20

meters was worthless.—KØSR

Stealth Dipole Antenna—need I say more? —K2LE

Still with portable setup 9 months later. 20 worked for ½ hour only.—K3MD

Well, it has been two years since my last Sprint, and with this one in the record books, I have now played in three. Although my score will not set any records, it is an improvement over the previous two, so I am quite satisfied. Twenty meters was not as expected, but it did give me the opportunity to practice. By the time I moved through 40 and on to 80, I was feeling more confident and comfortable.....then it was over! Never felt very loud as I missed many search/pounce first calls. Congrats to the big score SO2R ops—still don't quite understand if I will ever be able to do that, but the equipment is on order. If not for me—then Bill, K5GA, will get to use it the next time he operates from my station.—Bruce, N1LN (K5PTC, Bob).

The usual difficulties with low wire antennas and power line noise, but I made my goal of 100 contacts. Thanks!—K6UFO

Sprints are always fun and challenging!—KM4M

Everything on 20m was to the west. 40 and 80 played well. Lotsa mults. Worked ZF, NP4, KL7 and XE. Heard, but did not work SD and MO!—KOØU

Twenty did a swan dive after hour number one, but forty seemed to take up the slack pretty well, as did 80. No dead period between 0130 and 0230 like usually happens! With a little more second radio work, the 300 barrier may have fallen, but I was too scatter-brained to make the appropriate hay with it. Congrats to N6MJ for a really nice low-power score from down south!—NØAX

Very long skip and some flaky radio problems, but this contest is too fun to whine about. Can't believe I missed Michigan. I have *never* missed Michigan in any contest that I remember. Great activity out of W3 this time.—N9RV

I love the intense concentration.—ND2T

I vote we either start a few hours earlier, or else move the contest to 40/80/160 until the sunspots return.—VA3NR

Got on too late for 20m and 80m was very noisy.—VO1AU

My first time in the Sprint. Won't be my last. What a challenge! Thanks to G4BUO for pushing this contest (although it took me a while to jump in) and to W4AN for signing me up on a team. Hope I didn't embarrass you guys! Apologies to VE3JM who shows in this log as #121 but was actually sent 119.—W3EF

Had a slow start on 20m, but I'm happy with the improved score, my best Sprint so far. Used 100 W and a 3-element tribander and 40/80m vertical. It was fun.—Joe, W4SAA

It doesn't get easier, but it sure continues to be great fun.—W6MVW

Fun contest for my little brain! Great CW fun!—W7SW

Checklog because of transmitter trouble. Apologies for dropped QSOs.—W8TM

Thanks, KL7WV, for the 40-meter QSO! Yaesu FT-897 transceiver, 5 W into a 5-MHz OCF 28-gauge insulated wire stealth antenna up 40 feet in trees next to I-75 in a downtown Atlanta industrial area. SGC SG-237 autotuner. *Writelog* 10.44b.—WB6BWZ

My first real effort at a Sprint. Very interesting! I'll be there next time.—W5EKF

First time to work a Sprint. Great fun, I'll be back for more.—K5HP

My best first hour ever—107! Happy to catch every multiplier I heard.—K5ZD

Wait till Sept. Better yet, how about another one in May?—K7SV

Amazingly, the third hour of the Sprint, usually the worst, was my best hour!—K8MR

Was 20 meters light on propagation/activity or what? It was the first time I ever went to 40m before the first hour was up. An inkling of things to come in the sunspot cycle, no doubt.—KG5U

My second Sprint—felt a little less like a LID this time. Maybe I'll get the hang of it by #3?—N5AW

Had real problems editing real time. Finally had to give it up after 2 hours and get some rest. Will go paper next time.—VE3KZ

If it seems like all of my contest results postings include news of some catastrophe that precluded my beating the world, or even just being respectable—W5ZL

Great to see all the activity, even with the disturbed conditions. Thanks to all for the QSOs, and to George for letting me abuse his station and call sign for four hours. – N5RZ

Jeez, what a humbling experience, but to quote the Governator, "I'll be back." —K6SRZ

Good to be back on CW after being out of contesting for a couple of years.—W7ZRC

First Sprint with the QSY rule. I'm exhausted. Wish I had had more time—K4GM

My first Sprint, thanks to the encouragement of K5TR. A humbling experience, but I will be back. It was great fun even with my limited station.—KT5V

Would someone please share a strategy for finding mults with a single radio?—NI6T

First timer. Had a fun time. Looking forward to the next one.—W1EQ

I put many eggs into the 20m basket, since our club station is not equipped for low bands. On 20 I haven't worked a single 8, only two 9s and two 4s, but more than a half of Qs were from CA. (I made more 20m Qs with my room dipole from downtown Houston a year and a half ago than I did this time). Can't wait for my next fix.—NT5TU

The name I sent was JULIE, in memory of Julius Hoffer, W1DL, who died in December. I met Julie because of our QSO in my first Sprint, September 1992. I had my lowest QSO total in a long time, thanks mainly to weird, spotty propagation on 20, where I managed only 37 QSOs. I heard loud signals on 20 from much of the South, from TX, and briefly from the Northwest, but mostly whispers from elsewhere. Despite the poor conditions, I was glad to hear a number of newcomers. I hope they'll come back in September! I copied K4MA's name as GO PANTHERS but entered it without the space.—K1HT

Conditions on 20 meters were terrible! Still, I had a good time and I can't wait for the next one!—K2UA

80-meter QRP in the mountain west is just plain ugly!—K7UP

First time in Sprint. Learned I need practice!—KS1F

Always great fun!—KTØR

Fun! 20 meters?—N5QQ

First time working 4 full hrs!—WØZP

Great contest. It was especially nice to see all the new Sprint participants and so many multipliers well represented. Not heard: MT, UT, KS, ND, NE, VE2, VE6 or VE7—W2RQ

First time ever over 300! Twenty sucked, but 40 more than made up for it.—AE6Y

My 1st Sprint and poor location. Next year will be better.—K6VVA

First time in this contest in a while. Took some getting use to and by then it was about over...work 'em and haul butt. It was fun!—N4PN

Operating with 5 W to a piece of wire on the wrong side of a big building is a recipe for frustration, even from KP4! —K1ZZ

Best 4 hours in ham radio. I just need to find more mults next time!—K5AF

CT software worked great, Thanks Ken.—N2GC

Poor conditions—N5OT

In the previous Sprint I did 180 QSOs with a dipole from home. It took a real station to make 153 in this one. Thanks to K8MK for the use of the station.—N8VW

Low bands made it a breeze with LP.—NP4Z

My first Sprint! Hope I didn't bust too many calls.—W1JQ

Fun—a little better than last year, still trying to improve it—W6IXP

Very strange Sprint for me. Going away party for Dennis, W5KU, in the afternoon — he's off to rebuild Iraqi oil. He leaves, line noise arrives coming from the NE—S8 on 20, S7 on 40, S9+ on 80. So, the backscatter Qs were awful and since my mind was more on my friend's departure, I never got the rhythm going well. At least the new 80-meter vertical seemed to work fairly well. Looking forward now to September! —K5GN

I had trouble at the beginning, a 2-minute dead spot between my 1st and 2nd QSOs. Then things picked up nicely. I had 181 at the half, then lost concentration for the 3rd hour, dropping to a 70 hour. The last hour on 80 picked up to 82. At 0317 I had to take a bathroom break and lost 3 minutes. Darn! Overall, my 2nd best effort ever and second time over 300 QSOs. Not being SO2R proficient, I stuck to 1 radio/amp and 4 antennas, a monobander and tribander on 20, a 4 el KLM on 40 and a wire on 80. A grand total of four band changes. I snagged one mult on 80 and six on 40. Obviously, 20 is the multiplier band from California. Thanks to all for the QSOs. My apologies to those I stepped on inadvertently with an ill-timed "N6AN." And congratulations to Tree for cracking the 400 QSO ceiling. Yes!—N6AN

Well it was not a good effort on my part—the effort was good but the results were not! Started on 40 and had good rate (60/hr) after the first half hour and then decided I should try 20. Well, 20 was the pits—all I could hear were a few west coast stations and I could not hear the other side of the QSO. Strange. After probably too long trying to do something on 20, I went back to 40, but by that time 40 was much more crowded and I got beat out a lot when I called. And after getting the frequency I couldn't seem to raise anyone so I wound up S&Ping again. Then I decided to go to 80 and on the first call to K5GN the USB to RS232 port expander blew—couldn't stand the RF, I guess. So, I

spent 20-30 minutes troubleshooting and then re-cabling and got back on 80 where I had decent last hour. The highlight was only needing to ask for one repeat of GOPANTHERS! Still the best four hours in radio. Listen for me again in August.—NO5W

New to this contest. Needed better antennas and more power to compete. Limited time available between household chores.—K3CQ

Wow, I really suck at the CW Sprint! That must be why I look forward to it so much! By the end of the contest, I've finally gotten the rhythm down. Kudos to those who can do it right out of the block.—K6OWL

Really enjoyed this Sprint, as always. Actually did better in September, though. Still struggling my way up the learning curve. It's humbling to see the station you are about to call go back to the a station that just overpowers your own signal. I guess that's why we QRPers have to live by our wits, what we have left. Looking forward to the next lesson in humility.—N6WG

Got frustrated after calling CQ and tuning on 40m for 20 minutes with no Qs. Maybe conditions will be better next time.—AA4LR

Records Updated for February 2004

QTH	*Date*	*Call*	*QSO*	*Mult*	*Score*
CO	Feb-2003	N2IC	389	52	20,228
IA	Sep-2000	NØNI (AG9A)	331	43	15,093
KS	Sep-1982	KØVBU	231	42	9,702
MN	Feb-2003	KØSR	308	50	15,400
MO	Sep-1996	K4VX/Ø (WX3N)	332	46	15,272
ND	Feb-2002	WBØO	318	47	14,946
NE	Feb-1991	KVØI	204	34	6,936
SD	Feb-2003	WDØT	347	47	16,309
CT	Sep-2003	K1KI	369	50	18,450
MA	Feb-2003	K5ZD	365	54	19,710
ME	Sep-1988	K1KI	218	41	8,938
NH	Feb-2003	K1DG	331	50	16,550
RI	Feb-2002	KI1G	310	47	14,570
VT	Feb-2004	NT1Y (W4PA)	338	47	15,886
NJ	Feb-2003	N2NT	380	51	19,380
NY	Feb-2002	K2UA	321	50	16,050
DE	Sep-1989	KN5H/3	272	46	12,512
MD	Sep-1989	W3LPL	310	47	14,570
PA	Feb-2003	AA3B	320	50	16,000
AL	Feb-2004	K4NO	280	48	13,440
FL	Feb-2003	N2NL	357	55	19,635
GA	Sep-2003	K4AAA (W4AN)	404	54	21,816
KY	Sep-1998	K4LT	281	44	12,364
NC	Sep-2003	N4AF	342	49	16,758
SC	Sep-2003	W4OC	298	46	13,708
TN	Sep-2003	W4PA	393	51	20,043
VA	Sep-1989	K7SV	300	52	15,600
AR	Feb-2000	K5GO	278	50	13,900
LA	Feb-1995	W5WMU (K5GA)	306	48	14,688
MS	Feb-2000	WQ5L	317	49	15,533
NM	Feb-2003	N6ZZ	351	52	18,252
OK	Sep-2003	K3LR	352	48	16,896
TX	Feb-2000	N5TJ	381	52	19,812
CA	Feb-2003	W6EEN (N6RT)	378	54	20,412
AK	Feb-2000	KL9A	202	47	9,494
AZ	Feb-2000	K6LL	364	50	18,200
ID	Feb-2003	W7UQ (KL9A)	283	46	13,018
MT	Feb-1998	K7BG	273	43	11,739
NV	Feb-2000	K7BV	290	50	14,500
OR	Feb-2003	N6TR	393	52	20,436
UT	Sep-1991	K6XO	263	44	11,572
WA	Feb-2003	K7RI (K7SS)	297	53	15,741
WY	Sep-1999	K7KU (N2IC)	312	48	14,976
MI	Feb-2003	N8EA	331	52	17,212
OH	Feb-2003	K8MR	309	52	16,068
WV	Feb-2002	N4ZR	286	48	13,728
IL	Sep-2003	AG9A	362	52	18,980
IN	Sep-2003	N9RV	389	53	20,617
WI	Feb-2000	K9AA (K9PG)	302	55	16,610
VE1	Sep-2000	VE9DX (K5NZ)	183	40	7,320
VE2	Sep-1988	VE2ZP	214	41	8,774
VE3	Feb-2000	VE3EJ	270	50	13,500
VE4	Sep-2003	VE4/WB0O	266	45	11,970
VE5	Feb-2003	VE5SF	237	49	11,613
VE6	Feb-2000	VE6EX	228	43	9,804
VE7	Feb-2000	VA7RR	316	48	15,168
VY1/VE8	Feb-2000	VY1JA	36	22	792
4U1	Feb-1985	4U1UN (W2TO)	70	23	1,610
8P	Sep-2002	8P9JG (N5KO)	277	42	11,634
C6	Feb-1999	C6AKP	21	14	294
HH	Sep-1996	HH2AW	139	33	4,587
HI	Feb-1991	HI8DMX	40	19	2,430
HP	Feb-2000	HP1AC	64	30	1,920
KP4	Feb-2004	NP4Z	253	48	12,144
TG	Sep-2001	TG9/N5KO	150	42	6,300
V4	Feb-1996	V4ØZ (AA7VB)	54	23	1,242
VP2E	Feb-1996	VP2E/KJ4HN	68	30	2,040
VP9	Feb-1985	W6OAT/VP9	202	31	6,262
XE	Sep-1990	XE2XA (WN4KKN)	305	47	14,335
ZF	Sep-1992	ZF2KI (K1KI)	251	49	12,299
9A	Sep-2000	9A6XX	29	19	551
CT	Sep-1998	CT1BOH	225	40	9,000
EA8	Feb-1994	EA1AK/EA8	36	21	756
F	Sep-1990	F/N6TR	196	38	7,448
G	Feb-2002	G4BUO	160	40	6,400
HC8	Feb-2000	HC8N (N5KO)	271	52	14,092
I	Sep-1998	IKØHBN	100	35	3,500
JA	Feb-1991	7J1AAI	13	9	117
KH6	Sep-1981	KH6NO	121	30	3,630
LU	Feb-2003	LU1FAM	92	35	3,220
LY	Sep-2000	LY4AA	163	38	6,194
OH	Sep-1998	OH1NOA	56	22	1,232
PY	Sep-1980	PY8ZPJ	29	14	406
UA9	Feb-2000	RUØSN	15	13	195
UN	Sep-2000	UP6F	13	10	130
VK	Sep-1994	VK5GN (N6AA)	48	22	1,056
ZD8	Sep-1990	ZD8Z (N6TJ)	228	43	9,804
ZS	Feb-2000	ZS1ESC (N6AA)	51	18	918

Highest multiplier	Feb-2000	55	K9AA (K9PG)
Highest QSO total	Feb-2004	405	N6TR/7
Highest score	Feb-2003	21,306	K4AAA (W4AN)
Highest team score	Feb-2002	163,373	SCCC #1
Highest Low Power	Feb-2004	17,050	N6MJ (at W6KP)
Highest QRP Power	Feb-2002	10,800	K7RI (K7SS)
Logs received	Feb-2004	225	
Number golden logs	Sep-2003	17	
Number logs >=300	Feb-2003	52	

Scores

(* indicates low power; ** indicates QRP)

Call	Name	QTH	20	40	80	QSO	Mlt	Score	Team
K5ZD	RANDY	MA	77	160	131	368	52	19136	YCCC #1
K1KI	TOM	CT	91	136	105	332	51	16932	YCCC #1
NT1Y	ED	VT	47	175	116	338	47	15886	SSC #1
K1DG	DOUG	NH	68	145	108	321	48	15408	YCCC #3
K1EA	KEN	NH	53	102	116	271	44	11924	YCCC #2
NN1N	*CAT	CT	38	118	80	236	49	11564	YCCC #1
K1HT	*JULIE	MA	37	113	68	218	47	10246	YCCC #1
NY1S	*JOE	Me	5	100	55	160	41	6560	
W1EQ	*BOB	CT	8	69	71	148	39	5772	
N1XS	CHRIS	CT	32	44	39	115	37	4255	YCCC #1
K1NQ	*DAVE	NH	23	47	42	112	37	4144	YCCC #2
W1EBI	*GEO	MA	13	41	55	109	33	3597	YCCC #2
W1JQ	*MIKE	CT	11	33	36	80	28	2240	YCCC #1
WG1Z	*JOE	MA	0	29	18	47	23	1081	
AJ1M	*JAY	RI	0	6	7	13	13	169	YCCC #2
N2NT	ANDY	NJ	86	169	122	377	49	18473	NCC #1
W2RQ	BILL	NJ	50	115	147	312	47	14664	NCC #1
K2UA	RUS	NY	20	117	108	245	44	10780	NCC #1
N2GC	MIKE	NY	17	121	91	229	44	10076	YCCC #1
K2KQ	*DON	NY	34	82	94	210	41	8610	YCCC #1
N2ED	ED	NJ	46	97	49	192	41	7872	FRC & PVRC
K2LE	*ANDY	NY	12	35	95	142	37	5254	YCCC #2
WB2AA	*ALEX	NJ	17	51	56	124	39	4836	
K3NM	JOHN	PA	65	147	94	306	47	14382	FRC & PVRC
K3MM	TY	MD	37	138	97	272	50	13600	FRC & PVRC
AA3B	BUD	PA	58	142	88	288	46	13248	FRC & PVRC
K3WW	CHAS	PA	60	120	86	266	46	12236	FRC & PVRC
N8NA	*KARL	DE	16	110	93	219	46	10074	FRC & PVRC
N3AM	JOHN	MD	30	111	80	221	43	9503	
K3MD	JOHN	PA	32	84	83	199	41	8159	FRC & PVRC
W3EF	*MAURY	MD	22	121	42	185	44	8140	SSC #4
N3AD	ALAN	PA	35	65	56	156	44	6864	FRC & PVRC
WW3S	*JIM	PA	22	56	42	120	35	4200	NCC #1
NS3T	JAY	MD	0	10	48	58	30	1740	QSYers
KC3M	*JACK	PA	12	21	27	60	27	1620	QSYers
K3UA	*PHIL	PA	0	8	44	52	26	1352	
KS1F	*DAVE	PA	0	24	19	43	24	1032	QSYers
N9GG	*BOB	DE	8	16	14	38	22	836	SSC #3
K4AAA	BILL	GA	88	188	115	391	52	20332	SSC #1
N4AF	AL	NC	72	151	103	326	48	15648	SSC #1
K4BAI	JOHN	GA	55	111	120	286	48	13728	SSC #1
K4RO	KIRK	TN	67	91	131	289	47	13583	SSC #1
K4NO	GREG	AL	67	98	115	280	48	13440	SSC #3
W4OC	DON	SC	54	124	95	273	47	12831	SSC #1
K7SV	*LARRY	VA	20	142	106	268	47	12596	SSC #1
K4NNN	ELMER	FL	88	88	85	261	47	12267	SSC #1
KM4M	ACE	VA	42	134	89	265	46	12190	SSC #3
K4BP	ED	TN	77	120	73	270	45	12150	SSC #2
K4WX	DON	TN	72	97	75	244	49	11956	SSC #1
K5KG	GEO	FL	42	146	74	262	45	11790	SSC #1
N4DW	DAVE	TN	57	73	106	236	48	11328	
W4NZ	TED	TN	63	97	86	246	46	11316	SSC #3
K4AMC	JIM	TN	20	107	122	249	45	11205	SSC #3
KU8E	*JEFF	GA	43	107	89	239	45	10755	SSC #2
K4FXN	DAN	KY	21	111	110	242	44	10648	SSC #2
W9WI	*DOUG	TN	40	101	80	221	47	10387	SSC #2
N4PN	*PAUL	GA	40	97	75	212	45	9540	
N4CW	BERT	NC	64	112	40	216	44	9504	SSC #3
AA4GA	*LEE	GA	36	83	87	206	46	9476	SSC #2
K4IQJ	*DICK	AL	18	104	75	197	45	8865	SSC #2
N4OX	JAY	FL	43	96	57	196	44	8624	SSC #4
WA4TT	JOHN	GA	7	94	63	164	39	6396	SSC #4
K4MX	*JERI	VA	0	63	88	151	40	6040	SSC #4
W0UCE	JACK	NC	24	83	38	145	41	5945	SSC #4
AE4Y	*KENT	GA	18	53	70	141	40	5640	SSC #5
W1MO	*NORM	FL	39	65	32	136	37	5032	SSC #3
K4MA	GOPANTHERS	NC	14	78	37	129	36	4644	SSC #3
W4SAA	*JOE	FL	20	63	26	109	39	4251	SSC #4
W4ATL	*ROGER	GA	26	54	36	116	32	3712	SSC #5
N4FCG	*BOB	FL	0	100	0	100	37	3700	SSC #3
KØEJ	*MARK	TN	0	85	17	102	36	3672	
N5VI	*VAN	GA	23	47	29	99	36	3564	
K4GA	*MAC	GA	14	29	44	87	34	2958	SSC #4
W4ZW	JON	FL	0	38	0	38	26	988	SSC #4
AA4LR	*BILL	GA	28	15	0	43	16	688	SSC #5
KT4Q	*STEVE	GA	0	25	6	31	19	589	
AF4QZ	ADAM	SC	0	0	16	16	13	208	
WB6BWZ	**MATT	GA	0	14	5	19	10	190	SSC #5
K4GM	*GEORGE	VA	0	12	0	12	10	120	
K3CQ	*BILL	TN	0	0	11	11	8	88	
K5TR	GEO	TX	100	161	107	368	50	18400	Not bad for a five
K3LR	TIM	OK	60	154	128	342	48	16416	NCC #1
K5GN	DAVE	TX	83	147	98	328	48	15744	Not bad for a five
N3BB	JIM	TX	85	144	73	302	50	15100	Austin Powers
N4OGW	TOR	MS	75	119	96	290	52	15080	SSC #2
N5OT	MARK	OK	79	131	102	312	47	14664	Azen #1
K5YAA	JERRY	OK	42	134	112	288	48	13824	Azen #2
N5AW	*MARV	TX	67	123	74	264	52	13728	Not bad for a five
K5WA	BOB	TX	75	134	88	297	46	13662	Austin Powers
KZ5D	ART	LA	55	98	105	258	48	12384	SSC #2
N5DO	*DAVE	TX	63	118	90	271	45	12195	Austin Powers
WQ5L	RAY	MS	56	115	73	244	47	11468	Not bad for a five
N6ZZ	PHIL	NM	47	129	55	231	49	11319	Azen #2
N5PO	LEE	TX	41	101	98	240	45	10800	
N5QQ	RON	TX	36	99	99	234	46	10764	
W5WMU	PAT	LA	55	99	78	232	46	10672	SSC #2
K5PTC	BOB	TX	59	81	82	222	48	10656	
N5DX	KEVIN	AR	50	83	113	246	43	10578	Not bad for a five
K5AF	*PAUL	TX	62	95	97	254	40	10160	Austin Powers
K5KA	KEN	OK	63	105	50	218	46	10028	Azen #1
W5GN	BARRY	TX	63	99	29	191	45	8595	QSYers
NT5TU	*DENNIS	TX	63	75	41	179	42	7518	Austin Powers
W5ZL	*GARY	TX	55	75	42	172	42	7224	Austin Powers
KG5U	**DALE	TX	49	70	45	164	42	6888	Austin Powers
K7UP	**JOHN	NM	57	70	27	154	43	6622	Azen #1
N5TW	*JOHN	TX	36	63	44	143	40	5720	
W5EKF	*BILL	LA	18	67	43	128	40	5120	
W5DDX	*BO	LA	29	40	46	115	36	4140	QSYers
KT5V	*DAVID	TX	35	74	0	109	34	3706	Not bad for a five
K5HP	*TERRY	OK	32	38	49	119	31	3689	Azen #2
NO5W	*CHUCK	TX	5	66	35	106	32	3392	Not bad for a five
W6EEN	DOUG	CA	104	159	107	370	50	18500	SCCC #1
W6YX	MIKE	CA	106	144	84	334	52	17368	NCCC #1
K6XX	BOB	CA	110	136	83	329	52	17108	NCCC #1
N6MJ	*DAN	CA	106	158	77	341	50	17050	SCCC #1
N6AN	REX	CA	110	142	78	330	50	16500	SCCC #1
N6RO	KEN	CA	100	136	93	329	49	16121	NCCC #1
AC6T	STEVE	CA	73	168	76	317	50	15850	SCCC #1
AE6Y	ANDY	CA	97	155	54	306	50	15300	NCCC #1
K6LA	KEN	CA	113	135	63	311	49	15239	SCCC #1
W6JPL	MIKE	CA	98	144	57	299	50	14950	SCCC #1
W6OAT	*RUSTY	CA	94	134	52	280	52	14560	NCCC #1
AJ6V	ED	CA	97	146	46	289	50	14450	NCCC #1
W6EU	JIM	CA	86	120	65	271	51	13821	NCCC #1
N6AA	*DICK	CA	118	123	44	285	48	13680	SCCC #2
W6RGG	BOB	CA	84	112	69	265	50	13250	NCCC #1
NI6T	GARRY	CA	77	112	82	271	44	11924	NCCC #1
W0YK	ED	CA	74	119	62	255	46	11730	NCCC #2
K6NR	DANA	CA	105	99	38	242	46	11132	SCCC #2
N6ZFO	*BILL	CA	76	96	55	227	47	10669	NCCC #2
K6LRN	DICK	CA	26	135	40	201	49	9849	NCCC #2
N6HC	*ARNIE	CA	74	89	46	209	47	9823	SCCC #1
N6PN	*MATT	CA	54	106	61	221	42	9282	NCCC #2
WX5S	MATT	CA	74	78	48	200	40	8000	NCCC #2
W6MVW	DICK	CA	57	77	49	183	43	7869	SCCC #1
K6SRZ	*ALAN	CA	44	83	30	157	40	6280	NCCC #2
ND2T	*TOM	CA	61	57	37	155	40	6200	NCCC #2
K6XT	*ART	CA	74	38	8	120	40	4800	SCCC #1
W6IXP	TOM	CA	44	60	26	130	35	4550	NCCC #2
KX6SUB	**JERRY	CA	50	53	7	110	36	3960	NCCC #3
K6EY	*BECKY	CA	29	47	24	100	31	3100	SCCC #2
K6UFO	*MORK	CA	47	28	25	100	29	2900	NCCC #3
K6VVA	*RICK	CA	33	35	31	99	29	2871	NCCC #3
N6PE	*RICK	CA	26	28	19	73	29	2117	SCCC #2
N6WG	**BOB	CA	18	39	11	68	27	1836	NCCC #3
K6OWL	*MARK	CA	1	30	12	43	18	774	
K6DGW	FRED	CA	30	7	0	37	19	703	NCCC #2
W7SW	SCOTTY	CA	32	7	2	41	17	697	
K6CSL	BERT	CA	12	23	1	36	17	612	
K6ZCL	*TED	CA	6	0	0	6	5	30	SCCC #2
N6TR	TREE	OR	103	179	123	405	50	20250	Corner Pocket
K6LL	DAVE	AZ	125	137	75	337	49	16513	SCCC #1
K4XU	DICK	OR	82	134	92	308	51	15708	Corner Pocket
K7NV	KURT	NV	75	142	68	285	49	13965	NCCC #1
KY7M	LEE	AZ	89	131	70	290	47	13630	Azen #2
NØAX	*ED	WA	82	134	55	271	47	12737	Corner Pocket
N7LOX	*BRIAN	WA	78	117	61	256	45	11520	Corner Pocket
K9JF	JIM	WA	86	108	40	234	49	11466	
N7WA	*DINK	WA	89	97	52	238	48	11424	Corner Pocket
KC7V	MIKE	AZ	68	87	88	243	46	11178	Azen #1
KO7X	*AL	WY	57	142	28	227	47	10669	Colo Contesters
KI7Y	*JIM	OR	66	95	42	203	46	9338	Corner Pocket
KL7WV	TIM	AK	26	141	0	167	41	6847	NCC #1
W7ZRC	*ROD	ID	38	106	30	174	39	6786	Corner Pocket
W7YS	*BILL	AZ	39	80	15	134	40	5360	Azen #2
NC7J	**YO	UT	29	73	45	147	35	5145	
KH6SH	JOHN	UT	30	70	16	116	29	3364	
AL1G	KIM	AK	18	13	1	32	9	288	Corner Pocket
K7GS	**GARY	WA	15	5	0	20	11	220	
N6MZ	MIKE	WA	0	0	1	1	1	1	
K8MR	JIM	OH	66	100	104	270	49	13230	
K8AZ	JOHN	OH	51	126	62	239	48	11472	NCC #1
N4ZR	PETE	WV	12	104	105	221	48	10608	SSC #3
W8KIC	*VAL	OH	37	88	80	205	45	9225	NCC #1
N8VW	**PAT	OH	14	68	70	152	45	6840	
W8CAR	*DAN	OH	20	53	42	115	38	4370	NCC #1
K3JT	TERRY	WV	27	77	0	104	36	3744	
AD8P	*BILL	OH	7	41	45	93	38	3534	
K8JQ	STEVE	WV	5	60	32	97	32	3104	
W8WTS	*JIM	OH	19	36	34	89	31	2759	
K8DD	*DUCK	Mi	0	12	38	50	25	1250	
K5IID	*TOM	WV	3	23	22	48	24	1152	Austin Powers
W8TM	**PAUL	OH	0	21	0	21	15	315	
N9RV	PAT	IN	85	156	120	361	52	18772	SMC—CAT
AG9A	CAT	IL	72	136	111	319	51	16269	SMC—CAT
K9NW	CAT	IN	81	107	137	325	50	16250	SMC—CAT
N9CK	CAT	WI	55	97	131	283	49	13867	SMC—CAT
KA9FOX	SCOTT	WI	30	105	107	242	47	11374	SMC—CAT
K9AY	CAT	WI	53	85	93	231	49	11319	SMC—CAT
WI9WI	JIM	WI	65	91	78	234	48	11232	SMC
KE9I	CAT	IN	40	69	113	222	46	10212	SMC
K9ZO	*CAT	IL	33	79	89	201	45	9045	SMC—CAT
WT9U	*JIM	IN	28	75	92	195	44	8580	SMC—CAT
WE9V	CAT	WI	46	96	0	142	44	6248	SMC—CAT
K9KM	*HOWIE	IL	10	70	52	132	43	5676	SMC
KG9N	*CHUCK	IL	0	15	22	37	21	777	
KØSR	STEVE	MN	47	119	134	300	48	14400	
KOØU	CAT	MO	54	111	101	266	49	13034	SMC—CAT
NØAV	JIM	IA	60	98	107	265	45	11925	
NAØN	*PAT	MN	41	107	92	240	46	11040	
WØZP	WAYNE	CO	72	121	56	249	44	10956	
NØAT	*RON	MN	50	92	92	234	44	10296	
KTØR	DAVE	MN	32	85	73	190	44	8360	
WØETT	*KEN	CO	45	118	27	190	44	8360	Colo Contesters
NØSXX	*GARY	CO	53	84	55	192	41	7872	Colo Contesters
N4VI	*CHRIS	CO	28	56	0	84	31	2604	Colo Contesters
KSØT	*MIKE	MN	3	80	1	84	30	2520	
KØHW	*JIM	SD	2	20	23	45	23	1035	
WØNT	*PETE	CO	3	29	0	32	15	480	Colo Contesters
KØRI	**LOU	CO	0	7	7	14	9	126	Colo Contesters
VE3EJ	JOHN	VE3	46	102	111	259	46	11914	CCO
VE5SF	*SAM	VE5	53	139	39	231	45	10395	
VE3DZ	*YURI	VE3	32	102	93	227	45	10215	CCO
VA3NR	CHRIS	VE3	2	113	59	174	46	8004	CCO
VE3JM	*VLAD	VE3	19	78	74	171	41	7011	CCO
VO1AU	DAVE	VE1	0	79	36	115	40	4600	CCO
VE3IAY	*RICH	VE3	11	55	65	131	34	4454	CCO
VE3KP	*KEN	VE3	15	48	49	112	36	4032	CCO
VE3RZ	*TONY	VE3	7	63	11	81	27	2187	CCO
VE3KZ	*BOB	VE3	18	35	1	54	22	1188	CCO
VA7ST	*BUD	VE7	39	4	21	64	17	1088	
NP4Z	*PHIL	KP4	54	150	49	253	48	12144	SSC #2
XE2MX	*LOCO	XE	72	81	25	178	44	7832	SCCC #2
K1ZZ/KP4	**DAVE	KP4	3	18	1	22	14	308	YCCC #1

SAVE BIG ON ANTENNAS, TOWERS & CABLE

TELESCOPING ALUMINUM TUBING

DRAWN 6063-T832

.375	$.70/ft	1.250"	$1.55/ft
.500"	$.80/ft	1.375"	$1.75/ft
.625"	$.90/ft	1.500"	$1.95/ft
.750"	$1.00/ft	1.625"	$2.25/ft
.875"	$1.10/ft	1.750"	$2.50/ft
1.000"	$1.20/ft	1.875"	$2.75/ft
1.125"	$1.35/ft	2.000"	$3.00/ft
		2.125"	$3.50/ft

IN 6' OR 12' LENGTHS, 6' LENGTHS SHIP UPS. CALL FOR 3/16"AND 1/4" ROD, BAR STOCK, AND EXTRUDED TUBING.

CUSHCRAFT ANTENNAS

13B2/A148-10S	$159/89
A270-6S/A270-10S	$79/99
A3S/A4S	$459/549
A50-3S/5S/6S	$99/169/269
A6270-13S	$199
AR2/ARX2B	$55/69
AR270/AR270B	$89/99
R6000/R8	$309/459
X7/X740	$649/269
XM240	$679

CALL FOR MORE CUSHCRAFT ITEMS.

FORCE 12–MULTIBAND

C3	10/12/15/17/20m, 7 el	$659
C3E	10/12/15/17/20m, 8 el	$699
C3S	10/12/15/17/20m, 6 el	$579
C3SS	10/12/15/17/20m, 6 el	$599
C4	10/12/15/17/20/40m, 8 el	$799
C4S	10/12/15/17/20/40m, 7 el	$719
C4SXL	10/12/15/17/20/40m, 8 el	$1019
C4XL	10/12/15/17/20/40m, 9 el	$1189
C19XR	10/15/20m, 11 el	$999
C31XR	10/15/20m, 14 el	$1389

CALL FOR MORE FORCE 12 ANTENNAS

TRYLON "TITAN" TOWERS

SELF-SUPPORTING STEEL TOWERS

T200-64	64', 15 square feet	$1209
T200-72	72', 15 square feet	$1429
T200-80	80', 15 square feet	$1649
T200-88	88', 15 square feet	$1949
T200-96	96', 15 square feet	$2249
T300-88	88', 22 square feet	$2189
T400-80	80', 34 square feet	$2089
T500-72	72', 45 square feet	$1979
T600-64	64', 60 square feet	$1869

MANY MORE TRYLON TOWERS IN STOCK.

BENCHER / BUTTERNUT

Skyhawk, Triband Beam	$1129
HF2V, 2 Band Vertical	$249
HF5B, 5 Band Minibeam	$359
HF6VX, 6 Band Vertical	$339
HF9VX, 9 Band Vertical	$369
A1712, 12/17m Kit	$54
CPK, Counterpoise Kit	$129
RMKII, Roof Mount Kit	$159
STRII, Roof Radial Kit	$125
TBR160S, 160m Kit	$139

More Bencher/Butternut–call

M2 VHF/UHF ANTENNAS

144–148 MHZ

2M4/2M7/2M9	$95/109/129
2M12/2M5WL	$165/209
2M5-440XP, 2m/70cm	$179

420–450 MHz

440-470-5W/420-450-11	$139/95
432-9WL/432-13WLA	$179/239
440-18/440-21ATV	$129/149

SATELLITE ANTENNAS

2MCP14/2MCP22	$169/239
436CP30/436CP42UG	$239/279

ROHN TOWER

25G/45G/55G	$89/189/239
25AG2/3/4	$109/109/119
45AG2/4	$209/225
AS25G/AS455G	$39/89
BPC25G/45G/55G	$75/99/110
BPL25G/45G/55G	$85/109/125
GA25GD/45/55	$68/89/115
GAR30/GAS604	$35/24
SB25G/45/55	$39/89/109
TB3/TB4	$85/99

PLEASE CALL FOR MORE ROHN PRICES.

US TOWER

MA40/MA550	$1079/1669
MA770/MA850	$2789/4269
TMM433SS/HD	$1459/1759
TMM541SS	$1899
TX438/TX455	$1399/1899
TX472/TX489MDPL	$3099/7929
HDX538/HDX555	$1599/2799
HDX572MDPL	$7249

PLEASE CALL FOR HELP SELECTING A US TOWER FOR YOUR NEEDS. SHIPPED FACTORY DIRECT TO SAVE YOU MONEY!

COMET ANTENNAS

GP15, 6m/2m/70cm Vertical	$159
GP6, 2m/70cm Vertical	$149
GP9, 2m/70cm Vertical	$189
B10NMO, 2m/70cm Mobile	$39
SB14, 6m/2m/70cm Mobile	$59
SBB224NMO,2m/220/70cm	$69
SBB2NMO, 2m/70cm Mobile	$39
SBB5NMO, 2m/70cm Mobile	$55
SBB7NMO, 2m/70cm Mobile	$69
UHV4/UHV6	$109/149

MORE COMET ITEMS IN STOCK—CALL.

M2 ANTENNAS

50–54 MHZ

6M5X/6M7JHV	$209/269
6M2WLC/6M9KHW	$459/499

10/12/15/17/20M MONO

10M4DX, 4 Element 10m	$399
12M4DX, 4 Element 12m	$399
15M4DX, 4 Element 15m	$449
17M3DX, 3 Element 17m	$399
20M4DX, 4 Element 20m	$529

MORE M2 IN STOCK–PLEASE CALL.

GLEN MARTIN ENGINEERING

HAZER ELEVATORS FOR 25G

H2, Aluminum Hazer, 12 sq ft	$359
H3, Aluminum Hazer, 8 sq ft	$269
H4, HD Steel Hazer, 16 sq ft	$339

ALUMINUM ROOF TOWERS

RT424, 4 Foot, 6 sq ft	$159
RT832, 8 Foot, 8 sq ft	$239
RT936, 9 Foot, 18 sq ft	$389
RT1832, 17 Foot, 12 sq ft	$519
RT2632, 26 Foot, 9 sq ft	$869

UNIVERSAL ALUMINUM TOWERS

4-40'/50'/60'	$539/769/1089
7-50'/60'/70'	$979/1429/1869
9-40'/50'/60'	$759/1089/1529
12-30'/40'	$579/899
15-40'/50'	$1019/1449
23-30'/40'	$899/1339
35-40'	$1569

BOLD IN PART NUMBER SHOWS WIND LOAD CAPACITY. PLEASE CALL FOR MORE UNIVERSAL MODELS. SHIPPED DIRECT TO YOU TO SAVE YOU MONEY.

DIAMOND ANTENNAS

D130J/DPGH62	$79/139
F22A/F23A	$89/119
NR72BNMO/NR73BNMO	$39/54
NR770HBNMO/NR770RA	$55/49
X200A, 2m/70cm Vertical	$129
X500HNA/X700HNA	$229/369
X510MA/510NA	$189/189
X50A/V2000A	$99/149
CR627B/SG2000HD	$99/79
SG7500NMO/SG7900A	$75/112

MORE DIAMOND ANTENNAS IN STOCK.

MFJ

259B, Antenna Analyzer	$219
269, Antenna Analyzer	$299
941E, Antenna Tuner	$109
945E, Antenna Tuner	$99
949E, Antenna Tuner	$139
969, Antenna Tuner	$169
986, Antenna Tuner	$289
989C, Antenna Tuner	$309
1798, 80–2m Vertical	$249
1796, 40/20/15/10/6/2m Vert	$199

BIG MFJ INVENTORY— PLEASE CALL.

COAX CABLE

RG-213/U, (#8267 Equiv.)	$.36/ft
RG-8X, Mini RG-8 Foam	$.19/ft
RG-213/U Jumpers	Please Call
RG-8X Jumpers	Please Call

CALL FOR MORE COAX/CONNECTORS.

TIMES MICROWAVE LMR® COAX

LMR-400	$.59/ft
LMR-400 Ultraflex	$.89/ft
LMR-600	$1.19/ft
LMR600 Ultraflex	$1.95/ft

TOWER HARDWARE

3/8"EE / EJ Turnbuckle	$11/12
1/2"x9"EE / EJ Turnbuckle	$18/19
1/2"x12"EE / EJ Turnbuckle	$21/22
3/16" / 1/4" Big Grips	$5/6

PLEASE CALL FOR MORE HARDWARE.

HIGH CARBON STEEL MASTS

5 FT x .12" / 5 FT x .18"	$35/59
10 FT x .18" / 11 FT x .12"	$129/80
16 FT x .18" / 17 FT x .12"	$179/129
19 FT x .12" / 21 FT x .18"	$129/235
22 FT x .25" / 24 FT x .25"	$349/379

GAP ANTENNAS

Challenger DX	$289
Challenger Counterpoise	$29
Challenger Guy Kit	$19
Eagle DX	$299
Eagle Guy Kit	$29
Titan DX	$329
Titan Guy Kit	$29
Voyager DX	$409
Voyager Counterpoise	$49
Voyager Guy Kit	$45

PLEASE CALL FOR DELIVERY INFO.

LAKEVIEW HAMSTICKS

9106	6m	9115	15m	9130	30m
9110	10m	9117	17m	9140	40m
9112	12m	9120	20m	9175	75m

All handle 600W, 7' approximate length, 2:1 typical VSWR .$24.95

HUSTLER ANTENNAS

4BTV/5BTV/6BTV	$129/169/199
G6-270R, 2m/70cm Vertical	$169
G6-144B/G7-144B	$109/179

HUSTLER RESONATORS IN STOCK.

ANTENNA ROTATORS

M2 OR-2800P	$1249
Yaesu G-450A	$249
Yaesu G-800SA/DXA	$329/409
Yaesu G-1000DXA	$499
Yaesu G-2800SDX	$1089
Yaesu G-550/G-5500	$299/599

ROTATOR CABLE

R62 (#18)	$.32/ft.
R81/82	$.25/ft./.39/ft.
R84	$.85/ft

PHILLYSTRAN GUY CABLE

HPTG1200I	$.45/ft
HPTG2100I	$.59/ft
PLP2738 Big Grip (2100)	$6.00
HPTG4000I	$.89/ft
PLP2739 Big Grip (4000)	$8.50
HPTG6700I	$1.29/ft
PLP2755 Big Grip (6700)	$12.00
HPTG11200	$1.89/ft
PLP2758 Big Grip (11200)	$18.00

PLEASE CALL FOR HELP SELECTING THE PHILLYSTRAN SIZE FOR YOUR PROJECT.

WEEKDAY HOURS:
9 AM–5 PM CST

SATURDAY HOURS:
9 AM–12 NOON CST

CREDIT CARDS:
M/C, VISA, DISCOVER

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IC-7800
The Ultimate HF!

Multiple Meter Readouts See the latest in meter technology with the '7800's virtual meter system. These digital meters are visually superior to and of a higher performance than analog. Don't believe it? Log on to www.icomamerica.com/7800 and see for yourself!

Multiple Spectrum Displays You can select a standard spectrum display either centered on your operating frequency or a fixed range to view the band! Choose how you want to SEE the band, and then tune to what signals you see. (Photo shows the fixed range spectrum display.)

CF Card Slot The ultimate way to "take your rig with you". Just pull your CF card from your '7800, slide it into another '7800, and you now have your rig!

Triple Band Stack Registers Memorizes the last 3 used frequencies – quick recall for band hopping, provides the ultimate in multi-mode flexibility.

DUAL RECEIVER CONTROLS

Digital Voice Recorder Controls Simple record and play controls for the internal DVR. Great for quick recording and playback of a call, great for reducing the number of broken calls in your log.

Dual VFO Tuning Knobs Independent tuning knobs for each receiver. There's no mistake about which receiver you are adjusting, as the size difference allows for "no-look" operation!

DUAL RECEIVER CONTROLS

Gentlemen, start your engines. All four of them!

Power your way to front of the pack with Icom's new IC-7800. Cutting edge digital meets the best of world class analog, resulting in an amazing 110dB of receiver dynamic range and a *+40dBm IP3 in the HF bands!* But that's not all. The '7800 has two identical, independent receiver circuits. Receive two different bands simultaneously on different antennas, with no adverse effects from one receiver to the other – take your band hopping and contesting to the next level! There are four 32-bit floating point DSP units with 24-bit AD/DA converters, one each for the main RX, second RX, TX, and spectrum scope, to accelerate data processing to whiplash speeds! Newly designed power amplifiers provide a powerful 200W of output power at full duty cycle and low transmit IMD. So what are you waiting for? Make your move. See your authorized Icom dealer!

Dual Receive Controls Separate key receiver controls are available for each receiver. Controls for volume, RF gain, and DSP controls, the '7800 also has independent controls for the Digital Twin PassBand tuning as well as the 70 dB Manual Notch filters. Whether in a contest, or just hopping around the bands, easy access to receiver controls such as volume, RF gain, and AGC adjustments are at your fingertips.

Dual Digital Twin PassBand Tuning Only Icom brings you Digital Twin PassBand tuning. Adjustments can be made for each receiver without affecting the other receiver.

Independent Digi-Sel Controls Incorporated into the IC-7800 is a newly designed digital pre-selector, with separate controls for each receiver.

Independent Auto Tune Automatically zero beat your CW or AM carrier signals. The '7800 makes sure you're right on the proper frequency for these modes. Each receiver has a separate control.

Independent AGC Settings Multiple AGC settings for each receiver. On-the-fly adjustment for either preset AGC settings, or a completely variable AGC control.