NCJ

NATIONAL CONTEST JOURNAL

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May/June 1999

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KL7RA at his home station in Fairbanks, Alaska

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Dennis Motschenbacher, K7BV
k7bv@aol.com

NCJ Hot Picks

I received more comments regarding this one piece than the combined total received for all other articles that have appeared in the *NCJ* since I took the editor slot! We all owe Mike, K5NZ, a "thank you" for coming up with the idea.

Wow—what response. And those responses were nearly unanimously favorable. I did stir up a few negative comments, though, from some that felt that maybe the *Hot Picks* were weighted in one direction or other. I tried to immediately communicate with those who expressed concern. I found that the words I chose to open the article were generally the source of a lot of the trouble. Those remarks, taken in a context other than intended, might allow one to conclude that I handpicked the handicappers—thereby, deliberately or not—swaying the article input. The truth was that the picks came from anyone who bothered to respond to a posting on the CQ-Contest reflector requesting "picks" for the article.

With very few exceptions, you, the readers, enjoyed the spirit of the effort and are clamoring for a year 2000 *NCJ Hot Picks*. If I don't get run off in the mean time, we'll most likely do just that!

Hobby or Obsession?

hobby *n*: a pursuit outside one's regular occupation engaged in esp. for relaxation.

obsess *vb*: to haunt or excessively preoccupy the mind.

obsession *n.*: a persistent disturbing preoccupation with an often unreasonable idea or feeling.

For 37 years, I have struggled to keep Amateur Radio a hobby—but all too often it moved over into the destructive obsession arena. I do not once recall truly e*njoying* amateur radio when it dwelled in the house of obsession for me. Enjoyment was the intended goal justifying my behavior that always seemed to alienate me from "the real world." Frankly, I do not know if the pursuit of enjoyment was the obsession—with Amateur Radio being the vehicle to get me there—or vice versa. In either case, I found that I could not get there through any path other than my own perception of my place in life as a whole—which of course includes my hobby.

competition n: a contest between rivals.

competitive adj : inclined, desiring, or suited to compete <a competitive personality>.

Some explanation for my behavior came in Psychology 101—I saw myself in print when we covered competitive personalities. I know we are only talking about me here and not any of you, right?—but why did you grin a bit just now? We would not have any readers for the *NCJ* if most of you did not fit this personality profile. But, many of us take this competitiveness to obsessive ends.

We want to win! That in itself is generally considered healthy. It is only when one obsesses about winning that forces destructive to ourselves and those around us take over. That which follows in a person is never pretty to watch, as they begin to do unreasonable things—all in pursuit of the holy "win." Those wins become hollow and do not produce the sense of satisfaction, joy and massaged ego that we all openly or secretly seek.

win n: first place at the finish.

win vb: 1 a: to get possession of by effort or fortune. b: to obtain by work. 2 a: to gain in or as if in battle or contest. b: the victor in <won in war>.

So what sort of a win are you after in contests?—the noun or one of the verbs defined above? If we all used the noun definition above, darned few of us would ever experience a win, it would appear, since only one of us can take possession of that literal first place.

It occurs to me that one can be a winner by setting a goal and achieving it as long as you work by entering the battle or contest. Hmmm. This logic must be what leads so many contesters to feel that they "win" just by getting in a contest with reasonable expectations and goals.

Thinking all this through leads me to conclude that if we obsess about a "win *n* ", we are going to suffer a tremendous amount of pressure unless we are realistic about our chances of bagging that "win *n*."

I am all for the excitement of the contest—*trust me*. I personally live for it and know most of you do too. But if I obsess about it, I am setting myself up for a big personal disappointment should I attain anything less than a first place finish (read: "win *n*").

No matter how one chooses to define a win, if you don't work hard for it, there will be no sense of satisfaction when the contest is over.

contest n: a struggle for superiority or victory.

I had to squirm a bit when I read this definition for contest. How about you? You call yourself a contester, don't you? I personally was comfortable with that "victory" word but found myself on thin ground with "superiority."

In my 36½ years participating in contesting, I must admit that a good many more of them were focused on achieving superiority than were spent getting some victories. And I mean SUPERIORITY over YOU! I thought it would make me happy to be better than YOU; to gloat in your presence; to BEAT YOU. I wanted YOU to be MY adoring audience in Dayton.

Focusing on superiority when one does not have superior self-discipline, superior skills, superior station design and superior net personal income for superior equipment and antennas will only get you *superior disappointment*, my friends. Again, it seems the clearest path to a sense of winning achievement lies only within each of us—not from any outside source like YOU (read: you lose to ME.)

Unfortunately, I wasn't really superior to anybody—contesting stopped being enjoyable. It was not until I put things into a more healthy perspective that contesting began again to be fun, exciting and rewarding. A touch of humility and the ability to laugh at my goofs and stumbles while contesting now provide one heck of a lot more enjoyment for me than all those years of trying to be superior.

May you find and hold this precious peace, friends.

73, Dennis Motschenbacher, K7BV

Cover Photo

Richard, KL7RA at his home station in Fairbanks, Alaska. ■

Contesting—A Refreshing Perspective

John Unger, W4AU
w4au@contesting.com

After hearing the discussions about frequency fights; about stations that go to the trouble to broadcast 180 degrees off their beam headings to "keep others off their backs;" whether 4-over-4-over-4 monobander stacks are more effective than 5-over-5 stacks; about the various ways to defeat the intent of 10-minute rules; etc, etc, I thought it might be refreshing to relate the following…

Dennis, KF4TJI, and his wife Carol, KF4TJJ, showing their winning technique for working mobile VHF in the VA QSO Party with an H-T and a portable three-element Yagi.

This story actually starts over 2 years ago in 1997 at the March monthly breakfast meeting of our small, non-contest club (38 paid members, plus a few hangers-on), the Loudoun Amateur Radio Group (*LARG*). Between bites of eggs and sausage, I mentioned that I was planning to get on the air for the Virginia QSO Party, which was due to start that afternoon. A couple of others chimed in and soon there were four or five of us who vowed to get on the air and submit a combined "club" entry. You can imagine our surprise and pleasure when we later discovered that our very modest effort had earned us third place in the state as a club plus a few individual awards! That set the stage for 1998.

When he examined the 1997 results, our enthusiastic club President, NC4S, noticed that with a good turnout, LARG actually stood a chance of challenging the perennial club category winner, the Central Virginia Contest Club (*CVCC*), for first place. So, with his urging and leadership, the club decided to rally interest and put together a "serious" effort as a club entry in the 1998 VA QSO Party. It was a daunting task; we don't have any multi-multi "contest stations" in the club. In fact, I don't think any of us have more than one tower up, and there are only a couple of us who are moderately serious or particularly enthusiastic contesters (definition: enter more than four contests a year…). Paper logs and dupe sheets are the rule here in rural western Loudoun County, VA. We did have a crop of newly licensed hams that were eager to become mobile rovers and enough grizzled veterans to help with some advice and training sessions. Riding this wave of enthusiasm, as the appointed hour came, we started hammering out CQs and handing out counties right from the beginning.

At the final gun, it was incredibly gratifying to discover that we had had a total of 22 club members active in the QSO Party (a turnout of more than 50% of our members!), including six technicians (no-code), who recently got their licenses. Individual QSO totals ranged from 6 to 637! Everyone contributed and everyone had a ball! Many of our Novice/Technician class hams got in their cars and became VHF multi-county rovers, providing many important 3-point mobile contacts from some needed counties in the northwest corner of Virginia. For example, KF4TJI operated from 12 Virginia counties and logged 85 QSOs, all operating 2-meter FM simplex from his car—an outstanding effort.

I wish this story ended like the old-fashioned fairy tales, but, alas, our valiant efforts only moved us up to second place to the victorious CVCC in the club category—just a few thousand points behind the leaders. We didn't have the QRO horsepower to compete against the "real" contest club with a multi-multi station in the state, but without a doubt, this effort has been the best activity that our club has done in terms of enthusiastic participation since our first Field Day effort a few years ago. We had five club members in the top 10 overall. Seven LARG hams received certificates in various categories, and we had one overall plaque winner, as mentioned below. As a direct result of this event, we now have a number of new hams seriously studying CW and eager to upgrade so that they can enjoy the HF bands, and even get into other contests. Everyone in the club is proud of our effort and level of participation, and, of course, "Wait until next year!"

State QSO parties, especially ones in your "home" state, can be a great way of introducing new contesters to this aspect of Amateur Radio. Both in-state and out-of-state hams want to work you; the QSO rate is good but never overwhelming; and the event makes a good club-oriented activity when you enter as a team. Also, it is great to have a club like Sterling Park Amateur Radio Club (*SPARC*), which organizes the VA QSO Party, do such a good job. They provide scoring logs; a logging program specifically for the contest; and give out lots of handsome certificates for those who participate.

Finally, I've included a note attached to the log I received from one of our members, Carol, KF4TJJ; both she and her husband Dennis, KF4TJI are newly-licensed hams. Dennis won a plaque for his first-place finish in the Single Operator Novice/Technician All-Mode category.

73, John, W4AU

"To whom it may concern, in defense of my VA QSO Party Log(s):

Dennis, KF4TJI, is the driving force in the family for Amateur Radio; he is the one who was prepared—read the rules, asked questions, practiced on the logging software, etc.

My intention was to ride along and listen on Saturday as he made contacts and logged them in. When he made his first contact, and our friend and 'Elmer,' Temp, W4HZV, asked if I was there too, I got drawn into the contest. Then Nancy, KE4RTP, snagged me, too. At that point, I decided I might as well respond when called. I apologize for not being well prepared in radio procedure and logging techniques.

Dennis was using a computer log and hence his times were automatically assigned through the software as he logged the QSOs. I referred to the clock on the truck radio as we made our journey, so my times may not be as accurate.

I listened a bit on our hand-held at home on Sunday afternoon and was successful in making one contact. From conversations on Saturday, I was not clear about logging procedures when switching from a mobile to a fixed station, so I continued my numbering from Saturday on Sunday.

And as a final note, thanks to all of you who worked Virginia stations in the QSO Party. It made the event a lot of fun for everyone. Watch out next year—we're going to do even better!

73, Carol, KF4TJJ" ■

The ARRL Contest Branch

Dan Henderson, N1ND
ARRL Contest Branch Manager

We asked Dan Henderson, N1ND, the new ARRL Contest Branch Manager, to tell us what his intentions are now that he has had time to formulate a plan to strengthen the operations under his responsibility. His response was just what we all wanted to hear, "There is a new sense of commitment here and a turn-around is occurring in the ARRL Contest Office."

The goal of the ARRL Contest Branch is to provide fair and good service to our membership and the contest community. In order to enable us to best serve our constituency, we have implemented several changes with several more on the drawing board at the Contest Branch. Some are internal; some will require the assistance of the contesters themselves. Together, we can work to level the playing field for all participants as well and make this part of our hobby more enjoyable for all.

The ARRL sponsors or services 16 major contests. Annually, the Contest Branch will receive and process between 16,000 and 18,000 logs. With an increase in the sunspot cycle this total will increase. Specialized contests, such as the 10 GHz and Up Championships, may produce fewer than 100 logs. Our most popular event is Field Day, which will generate over 2000 entries. Each entry must be opened, sorted into its proper contest in-box, and eventually entered manually into the database. This is before any log checking or analysis work begins.

This is where you—the contest community—can make a huge difference. The General Rules for ARRL Contests (found on-line at the Contest Branch Home Page—**http://www.arrl.org/contests**—and annually in *QST*) are designed to facilitate how we handle entries.

With most hams on-line and the vast majority of contesters using one of the commercial logging programs, we are moving toward electronic submission of entries as the norm rather than the exception. You should name your files with your call sign as the file name and give them the appropriate extension (.sum for summary files and .log, .all or .prn for log files).

We are now providing unique e-mail addresses for each contest (see **Table 1**). These new addresses will soon be appearing in the various contest announcements and on the Contest Branch Home page. We encourage everyone to begin using these new addresses *immediately*. The previous address: **contest@arrl.org** will still be valid for contest log submissions until Field Day 1999. Beginning with the Field Day logs, *all* submissions should be sent directly to the individual contest's appropriate address. While we must allow this transition period, it would be helpful if you could begin using these new addresses ASAP. It should be obvious how this automatic "first sort" of submissions will help expedite log processing.

E-mail the log and summary files to the appropriate address as attachments (not as the text or body of the e-mail). The larger commercial logging programs generate ARRL format compatible files. If you develop your own logging program or use one of the smaller company's formats, make certain that the output file conforms to the ARRL accepted file format as found in the General Rules. If you don't use e-mail, send your data files on a $3^1/_2$-inch diskette accompanied by a copy of your summary sheet. If you still use paper logs, please make certain you have a proper summary sheet completed as well as dupe sheets if required.

Another rule to keep in mind is only one entry per submission. Recently one ham sent in logs for 5 different contests in a single envelope. This creates several problems. First, if the data entry person had not noticed the multiple submissions on one disk, several of them would never have made it to their respective databases. Also, by waiting to send in the scores for all five contests (CW and Phone Sweepstakes, 160 and 10-Meter Contests and the EME score), he had missed the 30-day deadline for sub-mission of the two Sweepstakes entries. If you use US mail, *only one contest and entry per envelope and clearly mark on the outside of your envelope the name of the contest* (10-Meter, 160-Meter, etc).

The 30 days for submission rule has been on the books for some time but has rarely been enforced. Because of the more extensive use of volunteers for log checking, and tighter space requirements and deadlines for *QST*, we must start adhering to the deadlines. Logs must be postmarked or e-mailed no later than 30 days after the end of the contest weekend. Separate weekends of the same contests, such as Phone and CW Sweepstakes are viewed as separate contests and have their own deadlines.

The deadlines are there to allow us time to do a thorough job of preparing and reporting contest results. We need this time to do the initial data entry, ship the logs to the checkers, allow them time to run them through their programs and generate reports and to get these results back for analysis. We then write the summary article for *QST*. This material is then turned over to the production team and editorial staff for final preparations for publication. Because of the tight time frames involved, stricter adherence to deadlines must become the norm.

Better log checking is here. Starting with the 1998 IARU HF World Championship, we have utilized the assistance and expertise of outside computer experts to allow us to do more in-depth log checking. (My personal thanks to the volunteers who are providing all of us with this valuable service!)

Don't go through and remove QSOs from your log if they are sequentially numbered: score dupes and such as no points contacts. Removing QSOs already entered causes problems when the log checking looks for numbered contacts, and can lead to the dreaded "not in log" to appear. With more sophisticated log checking, we will also be able to find problems more readily, as well as identify those rogue operators who may be working outside of the rules. More extensive examination of the logs will lead to a more level playing field for all participants.

My personal goals at the Contest Branch are to provide accurate scoring and reporting of entries, promote contesting within our great hobby, and above all, to provide the members of the League and our contest friends prompt and friendly service. If you have questions or problems please contact me directly at **n1nd@arrl.org** or at 860-594-0232. There is a new sense of commitment here and a turn-around is occurring in the ARRL Contest Office. With the help and cooperation of the contest community, it will continue.

73, Dan Henderson, N1ND
ARRL Contest Branch Manager ■

Table 1

To expedite log processing, we have created individual e-mail addresses for each contest. To allow time for transition, the old address: contest@arrl.org will still be valid until June. Starting with the logs for Field Day 1999, all submissions should be sent to the new e-mail addresses shown here. It would be helpful if you begin using these immediately.

StraightKey@arrl.org	FieldDay@arrl.org	SeptemberVHF@arrl.org
RTTY@arrl.org	IARUHF@arrl.org	CWSS@arrl.org
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DXPhone@arrl.org	10GHz@arrl.org	ARRL160@arrl.org
JuneVHF@arrl.org		ARRL10@arrl.org

Aurora is NEVER Pretty

Richard A. Strand, KL7RA and Ari Korhonen, OH1EH

From Alaska: Richard and I spent more time naming his article than it took him to write it. Other possible titles included: "How to get the 'Worked All UA0' award in 10 minutes or Less," "Have people call CQ in your face—and Like It," "SS Contest Strategy—Working the Elusive VY1 the Easy Way," "CQWW Contest Strategy—Working Zone 19 on all bands with a Dummy Load," "Coax does not unroll at –4°F."

When Richard eventually leaves the Frozen North, he will most definitely be missed. He currently holds the Zone 1 CQWW CW records in the following categories: All, M/S and the following Single Band slots—14, 7, 3.5 and 1.8 MHz. He also holds the Phone records for M/S and M/M.—K7BV, Editor

Multi-Single Team for 1992 ARRL DX at KL7RA. (L-R: KL7RA, AA6DX, AL7KK, AL7CQ, NL7KB.

The moving van had just left. I was still installing the first antenna from my East Coast arsenal when Ron, KL7HCN, long time ham and veteran Alaskan contester, walked up. Ron looked up and down the sixteen-foot whip and said, "Don't spend too much time trouble-shooting the coax. That won't be the problem." He was right. I never heard a signal on that antenna no matter what I did to "fix" it.

Welcome to Fairbanks, one hundred miles south of the Arctic Circle, where the sun can shine at midnight (or not at all), and competitive Amateur Radio can be a challenge. Let it be understood from the start that this essay has nothing to do with the majority of the Alaskan stations that you work in contests. They are hundreds of miles south of here and enjoy beautiful ocean side locations or the Alaskan picture postcard views seen in magazines. They, at times, may even have HF radio propagation.

Fairbanks is located near, well, no place. Russia is to the west and the Arctic ice pack is to the north. East is the Yukon Territory. During the gold rush days, the two territories didn't always get along so we dug a trench in the tundra between us. (This is probably one of the only geo-political boundaries that can be seen from the air.) Home to a multitude of scientific research operations, the city is uniquely located under the aurora zone and is where the majority of that research is done. NASA, using the same guidelines the military does when selecting isolated radar sites, chose Fairbanks for one of its radio astronomy observatories. Fairbanks is not in the most isolated part of Alaska. That may be Coldfoot, Deadhorse or Burntpaw not too far north of here.

After arriving here in the summer of 1971 and installing my Yagi and rotator, I found I didn't know where Fairbanks was myself. Alaska is not directly north of anything except a few islands in the Pacific. The States are east, Moscow is due north over the pole and Japan is due west. Over the many years, I have seen strange skewed paths on all the bands. Sometimes on 40 meters, the path is skewed 90 degrees for Europe. Even after finding the correct path, you seldom can work the European stations because they will complain of severe flutter. In the dead of winter, the 20-meter band can be silent except for loud Antarctic stations. I have seen the 160-meter band open 24 hours a day to Europe. I have also seen the band dead for weeks at a time. The behavior of 160 meters does not cross correlate to any other band and is a super challenge.

Contesting from Fairbanks can be fun. Really! I have seen my multi-op station make contacts on all six bands at the same time. I have seen the 40-meter band so choked with signals we had to "listen down 5". I have seen our European runs on 10, 15 and 20 last all night. Mostly we don't see any of that. It's always a crapshoot. When the bands are bad for you, they are really bad for us. When they are really bad for you, we're checking the SWR to see if the antennas fell down!

Propagation conditions here are slow to recover even from a minor event. We never can tell what will happen. The bands can be just screaming before the contest and we start great, only to see a slow fade to the point where we don't work another station for hours. Later, we read how super everything was, and how many records fell (?!). I can tell you what fell around here, more trees and even more antennas. I will never give up trying to beat the system. Even when the bands are dead quiet and the aurora

is visible overhead from horizon to horizon, with its bright greens and blood reds, we always have "the next one" to look forward to.

The 80-meter band is a special case. If you can think of an antenna for 80, I've tried it. We have times when nearly *any* antenna works, and we have times when *none* do. Here's why: The aurora can cause a sporadic E-layer to form over the Arctic, effectively shutting the 80-meter band down. I have topside ionosphere soundings made at work during contests. They may show a slow moving E-layer creeping in over the city. The 80-meter band will go quiet until the E-layer drifts away and the QSO rates go up again. For 80 meters, I ended up keeping a very high simple dipole, a very good vertical located far from the HF towers and a 150-foot inverted-V. None or all may work hour by hour, or even minute by minute.

In this arctic climate, I use a low temperature lubricant in my antenna rotators specially made at the observatory for use on the radio telescope. The jumper from the hardline to the antennas is a special order arctic grade RG-214. During contests, I have enough antennas aimed for the three main directions so we seldom have to turn one. The coldest time of the year normally happens around the ARRL DX contests and the antennas stay pointed towards the lower 48 states.

I seldom move the antennas when the temperature is below –40°, and never when it's less than 50 below zero. I have contested at –70°F, but the guest operators can't start their cars afterwards as my station only has enough AC power to run either the 1500 W amplifiers or the 1500 W engine heaters needed here in Fairbanks. When it gets much below –40°, we have no wind, no snow and no daylight.

As a multi-op station, we have made large numbers of contacts in the World Wide contests, but our overall scores are poor due to the lack of country multipliers on 80 and 160. It is possible to do well on a single high band if you chose the right one and have a solid European run.

The WPX contests, by far, allow us our most competitive scores as the low band multipliers are no longer important. The competition for good frequencies and the QSO rate pace is not as fierce. The big competing multi-op stations often sit this one out as they recover from the ARRL wars. In these contests, a great DX or East Coast location usually doesn't guarantee a win. Our scores also benefit as we draw the WAS/DXCC/WAZ non-contesting crowd as well. These contests generate the most QSL card requests. When the time-off rule was changed, however, it ended the top scores that were possible from Fairbanks for single-operator entries.

The hours of propagation to the lower 48 during the ARRL DX contest are probably no better nor worse than for most of Scandinavia. Our real problem is the other Alaskan stations to the south that have daylight during the "day" during this time of year. For example, stations on the island of Sitka (by the sea), 700 miles south of Fairbanks, may have many hours of stateside propagation before we begin hearing the first watery W7s. They also do very well on the low bands going east. To make matters worse, we often can hear them racking up the points long before we can hear their stateside pile-ups. It's times like these I'm happy to know none of our contest team can "bail-out," as their cars are all frozen solid in the driveway!

Fairbanks has two seasons. This winter and last winter. My first winter provided a rapid learning curve for arctic contesting. My East Coast antenna rotator froze solid before the World Wide so I went up the tower to replace it with an arctic winterized version. Typical new-guy mistake. Towers really suck heat from your hands at 50 below zero, even with large bulky gloves on. These gloves don't allow you to handle the tools well, so when you pull one off to actually do something, your hand numbs up fast. Once I had the first bolt out, I had to get the glove back on quick, so I stuck the bolt in my mouth!

Don't do that, kids. It felt like I was hit in the face by Mike Tyson. My ears were frozen by this time too, but this was of little concern with a $^3/_4$-inch bolt cold welded in my mouth. I walked around for the next week with swelled-up lips, looking like a carp, a fact not missed by the old Alaskan sourdoughs I work with. I seldom work on towers in the winter anymore.

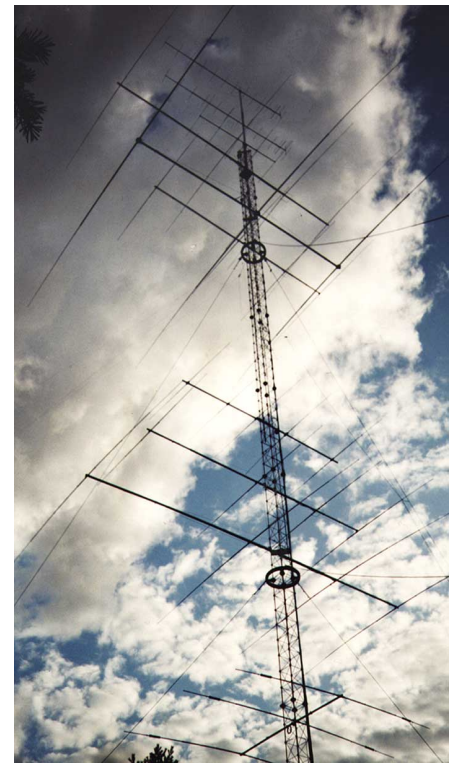
During our short summers when the sun is to the south, the temperature can get into the balmy high sixties, much too warm to climb. I prefer to do all my summertime tower work after midnight when the sun is to the north and it's not so miserably hot.

Retirement for me is just around the corner. After this sunspot cycle peak, the wife and I will break camp and head for the land of 24 hour-a-day great radio conditions. As both our families are in the same area, we will be setting up the new fort in the northern part of W9 land. I can't wait…

And from Finland~

ARRL DX SSB '99 THE HARD WAY—OH1EH MEETS THE AURORA RF SPONGE

Here in Finland we often read stories about people going to the Caribbean and working 6000 QSOs in the ARRL SSB with a 3-element tribander at 20



feet and some wires for the low bands. We also listen to stations in southern Europe running the US on the low bands and giving excellent reports to stations that we just can't hear. Up here, however, it's a different story.

Due to its location at 60 degrees north latitude, Finland is inside the auroral zone. This story hopefully gives you an idea what it was like to operate the 1999 ARRL SSB from a well-equipped OH station when aurora cut off most of the traditional propagation paths to North America during the contest.

Minutes before the Contest—Friday 2345Z

I check 20 meters and find the Big Guns warming up. Things do not sound very good —the East Coast multiops are not too strong. Aurora? A few minutes later I find OH8LQ with a tremendous amount of flutter on his signal. No doubt about it, Mother Nature's big attenuator is on and that means TROUBLE over here!

Contest Time!

I find K1AR at the band edge and he becomes the first QSO of the contest (after he first works 9V1YC). I start S&Ping up the band and work all the guys I can hear: N2RM, K3ANS, KC1XX, K1TTT, N0NR, W3BGN... you get the picture. After the first ten minutes I've worked everyone I can hear and even tried a few CQs in vain. Its time to QSY to 40 meters. I find the Big Guns CQing but only Bob, KQ2M, and KC1XX hear me. Later I talk

with OH6NIO who said that he also had problems getting out on 40 meters. Both of us have 3-element full-size Yagis at 120 feet on 40 meters and people still keep CQing in our faces. Oh well… I call KB1SO, W3LPL, N2RM, W3PP *et al* like crazy, but they just cannot hear me. Talk about bad propagation! Time to check 80. Oh no—only K1FZ is heard and he is about 4x4. I called him a few times, but no contact is made.

At 0030Z I find 20 meters open a bit. A few CQs finally produce a small run. 20 Big Guns later, it is all over. Time to check 40 meters again. This time K3LR, K1KI and K1AR can hear me, but many others still can't. I'm scanning 20-80 meters the rest of the night and at 0125Z W1FJ is the first one who hears me on 80 meters, but not without much trouble. Only W1FJ, KC1XX, K9NS and K5ZD make it into the 80-meter log the first night. K9NS must have some big antennas over there in IL—he was even louder than W1FJ!

40 meters opened up a bit around 0200Z and people actually kept coming back to my CQs. I managed to work about 100 guys on 40 meters and then the rest of the night is spent on 20, which has some propagation at my sunrise. I finally go to bed for two hours at 0830Z with about 230 QSOs in the log.

I start tuning 20 meters at 1030Z but it isn't until 1045Z that I hear my first station—VO1MP. At the start of the opening, KC1XX and K1AR are about two S units above the rest of the stations. Signals even out as time goes on and it is quite hard to tell who is the loudest at the peak of the opening. K3LR always does a good job considering he's almost a W8. I QSY to 15 meters at 1130Z, but only VO1MP, K1KI, N2RM, K1AR, K1NU, W1FJ and KC1XX are worked.

Finally at 1230Z 15 meters really comes to life. Five hours later I note that there are almost 500 QSOs in log. I kept checking 10 meters with the second radio time after time, but all I can hear is southern Europeans working stations that just aren't audible here.

At 1619Z I finally hear the first NA station on 10 meters—N2TX. He is about 4x4, but he cannot hear me. A few minutes later W3LPL moves me from 15 meters to 10, but I just barely hear them there and we do not make it. Ditto N2RM.

1800Z comes and 15 meters opens to the West Coast with K7RI and W7GG leading the way. I struggle the rest of the night there and finally hit the sack at 00Z with 677 QSOs in the log.

Back in action at 0200Z. 20 and 40 meters are dead and the only band with some action is 80. W4MYA has the best signal there and he is about 5x5. Finally I work W3LPL and N2RM also, but K1FZ, KM2P, K2WK, K1TTT, N2TX and W3PP just can't hear me. N2RM asks me to look for them on 1824 kHz. I do, but only hear a whisper on the frequency. I do listen to TM1C running 'em at 1837 kHz. Needless to say; I can't hear any of the stations he is working. 40 meters is checked at 0425Z, but the only signal up there is W3LPL—and they are only S5 here. While having a cup of coffee, I spend some time on 80 listening to OT9T (ON4UN) running around 3765. Sunrise occurs at 05Z, but the low bands are even worse than the first night. My sloper array at120 feet just doesn't cut it. When the contest is over, only 7 stations have made a two-way contact with me on 80 meters! I still keep wondering how K9NS was so loud!

I decided to take a break at 08Z and drive home (three miles) for a shower and breakfast. Back in action at 1124Z, I work Fred, K3ZO on 20 meters. Signals are stronger than the previous day and I finally get the feeling that my 4 over 4 is performing like it should! I spent the afternoon on 20 meters and the rate finally is over 100. At 1700Z, VO1MP shows up on 10 meters for a new one on. It turns out that he is the only station worked on Sunday on 10 meters! I work only 10 stations on 10 meters during the whole contest: KC1XX, N4BP, W3EA, K3ANS, W3PP, W4MR, VO1MP, W1FJ, N2RM and K1RX.

I found 15 meters open at 1710Z. I spend the rest of the contest there with frequent checks on 20 meters. Propagation is still kind of weird. 20 is very poor most of the time, but 15 did open even to the Midwest and West Coast. Lew, W7AT, is loud—ditto W7WA, W6CCP and few others. George W0UA (at W0UN) is so loud that I have to ask what antenna he is using. Their three-high stack at 200 feet sure was working nicely!

Here's the summary sheet:

Band	*QSOs*	*Mults*	
160	0	0	
80	7	6	
40	121	34	
20	589	56	
15	508	58	
10	10	8	
Totals	1235	162	= 600K

In retrospect the contest was still fun. Those difficult band conditions presented quite a challenge, but again that situation is not anything new to us up here in northern Europe.

The following equipment was used here at OH1EH during the contest:

FT1000MP, TS830S, AL1200

160 meters	GP
80 meters	sloper array at 120 feet
40 meters	3-element full-size Yagi at 120 feet
20 meters	4/4 stack at 140 feet
15 meters	4/4/4 stack at 120 feet
10 meters	5-element Yagi at 75 feet

Thanks for the QSOs. See you from home or OH0Z - our new OH0 contest station!

73, Ari Korhonen, OH1EH ■

SCVs: A Family Album *Part 5:* Shorties, Double-Wides and Twins

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We have looked in some detail at deltas, rectangles, and half squares—the three main types of self-contained vertically polarized wire antennas (SCVs). Unfortunately, space has not permitted a detailed look at all of the antennas and their variations on all of the low bands. But hopefully, the modeling exercises will be suggestive enough for you to carry on independently.

In our final episode, we shall be even more hurried, and hence must confine ourselves further. We shall look at shortening techniques for some of the SCVs, at open-face double-wide versions of them, and at the basics of parasitical techniques applied to the SCVs. We can only cover the ground by sticking to one band (80 meters), one soil type (Average: C = 0.005 S/m; DC = 13), and limited variations. Again, I hope the data will be enough to let you extrapolate to your specific needs.

Shorties

Of all of the SCVs, the delta has proven the most popular antenna to shorten. A full-size equilateral delta for 3.6 MHz is about 96 feet long at the base, with an 83-foot height. Add to this the requisite minimum height for adequate to optimal performance, and the antenna becomes a very major enterprise.

Even some shortening can be beneficial. For reasons that will become apparent, I have limited discussion to 3/4-size deltas, which—at 3.6 MHz—become 72 feet wide by 62 feet high. The 21-foot height saving alone can make the difference between the antenna being feasible and being impossible.

Figure 1 shows perhaps the three most common forms of loading the shortened delta in order to make it resonant once more. In *Low Band DXing*, ON4UN shows some of these and other loading schemes.[1]

In some respects, all three techniques are varieties of one technique: adding wire to the highest impedance point possible in order to sustain the high current parts of the antenna for maximum field strength.[2] However, the techniques show some interesting differences.

One of those differences is the feedpoint, which is distinctly higher up the side for the double-wire top-loaded model than for the other two models. For maximum vertically polarized radiation, the feedpoint was chosen to yield the lowest take-off angle possible (with verifying checks upon the remnant horizontal field to confirm minimal field strength in that polarization). One can fine-tune this point in models by selecting the feedpoint so that the final horizontal field (which is a cloverleaf in azimuth patterns) is as symmetrical as possible.

Part of the reason for the higher feedpoint up the side of the double-wire top-loaded model is the current distribution in the loading wire assembly. The current magnitude in each of the two wires at the apex is about 0.8 of the source current. In both the single-wire loaded versions of the antenna, the current is about double this value.

Table 1 shows the results of modeling each loaded delta, along with a full size equilateral delta for comparison—all over average soil. Immediately apparent is the fact that the top-loaded deltas require the same baseline height as the full size delta for maximum gain. Although the

[1]Notes appear on page 14.

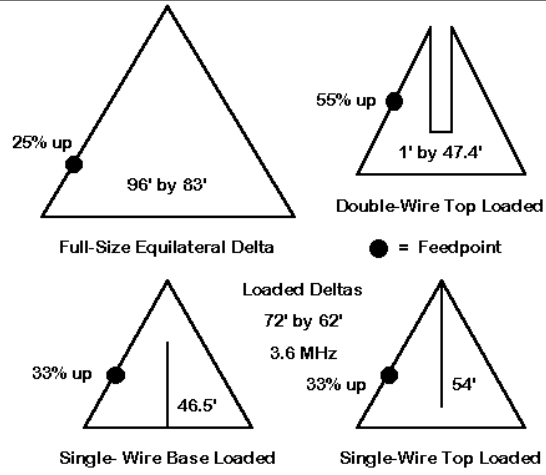


Figure 1—Various ways to load a small equilateral delta.

Table 1
A Comparison of Shortened Equilateral Delta 80-Meter Loops

	Full Size Delta Loop			*Double Wire Top Loaded*			*Single Wire Top Loaded*			*Single Wire Base Loaded*		
Height (in feet)	*Gain (dBi)*	*TO (deg)*	*Feed Z (R+/-jX)*	*Gain (dBi)*	*TO (deg)*	*Feed Z (R+/-jX)*	*Gain (dBi)*	*TO (deg)*	*Feed Z (R+/-jX)*	*Gain (dBi)*	*TO (deg)*	*Feed Z (R+/-jX)*
10	1.28	22	196+*j*41	0.55	23	87+*j*39	0.62	23	76+*j*33	0.33	22	40+*j*12
20	1.48	20	167+*j* 1	0.80	21	72+*j*12	0.86	21	65+*j* 7	0.71	21	32+*j* 0
30	1.58	18	147-*j*13	0.92	20	63+*j* 3	0.96	20	57-*j* 2	0.81*	19	28-*j* 4
40	1.62*	17	132-*j*18	0.97*	18	56+*j* 2	0.99*	18	51-*j* 6	0.80	17	25-*j* 6
50	1.59	16	122-*j*17	0.96	17	51-*j* 2	0.97	17	47-*j* 7	0.74	16	23-*j* 6
60	1.50	15	114-*j*13	0.89	16	47-*j* 2	0.89	16	43-*j* 7	0.62	15	22-*j* 6
70	1.34	14	110-*j* 8	0.76	15	44-*j* 1	0.75	15	41-*j* 5	0.47	14	21-*j* 5

Note. Full-size delta loop: 96-foot baseline, 83-foot height; shortened delta loops (3/4 full size): 72-foot baseline, 62-foot height.
Double-wire top load is 1-foot wide by 47.4 feet long; single wire top load is 54 feet long; single wire base load is 46.5 feet long.
All antennas: #12 AWG copper wire. Height entry: baseline height above ground. Design frequency: 3.6 MHz.
All antennas over average soil (C=0.005 S/m; DC=13).

base-loaded delta finds its maximum gain level 10 feet lower, its overall gain is also lower than either of the top-loaded models. Between the top-loaded models, there is little if anything to choose. Both provide close to a 50-Ω match (with the base-loaded model having about half the feedpoint impedance of the top-loaded models). The gain of the best-loaded delta is down by two-thirds of a dB from the full-size model, an amount that is usually not too significant operationally.

Like the full-size right-angle delta, which has a feedpoint impedance and 80-meter height that closely accord with those of the loaded deltas, the feedpoint resistive component does not change radically across the 80-meter band. This makes the loaded delta a candidate for remotely tuned series capacitance compensation for an antenna designed to have inductive reactance all across the band or across some part of the band of interest. Models also suggest that the antenna gain increases more rapidly as the antenna is "oversized" than is the case with dipoles and similar horizontally polarized antennas.

The limitation on the delta used for the modeling sequences is that the single-wire top-loading element had to fit within the delta. In practice, where many delta users install them at angles other than vertical, the wire can be almost any length.[3] (However, heed ON4UN's warning about the high voltage on the end of this wire.) Where the wire may seem to require more length than the delta permits, the end can be split, folded back, or coiled, although each of these techniques may increase the need for very careful adjustment.

The techniques just listed are more commonly applied to shortened half-squares, as illustrated in **Figure 2**. Half-squares tend to lose the least performance when the length of the phasing line is left intact and only the length of the vertical members is shortened. I ran a series of free space models to check the performance losses with shortening. The full size half-squares with 77-foot verticals showed a gain of 4.6 dBi and a resonant feedpoint impedance of about 63 Ω. Using the symmetrical hat technique of loading, I shortened the verticals to 60 feet with horizontal spikes running 10 feet each way from the element ends. The gain dropped to about 4.45 dBi, with a decrease in the feedpoint impedance to 57 Ω resistive. Enlarging the hat spikes to 20 feet each permitted the verticals to be only 46 feet long: the gain dropped to about 4.1 dBi and the feedpoint impedances decreased to 45 Ω resistive. Similar decreases could be expected over ground relative to a full-size half-square. The design question remaining would center on choosing a compromise between the top height for the lowest take-off angle and the bottom height for maximum gain from the shortened antenna.

The key element in successfully obtaining maximum performance from a shrunken SCV is to place the loading at the high-voltage high-impedance portion of the antenna, leaving the high current portions as undisturbed as possible. In addition, design work should also include pre-construction modeling exercises to locate the feedpoint at the position which produces maximum vertically polarized radiation and minimum horizontally polarized radiation—assuming that one wishes SCV-type performance.

Double-Wides

At the other end of the scale from the shorties are the side-by-side double SCV antennas. Versions have been built for each of the major SCV types, so that there are double-humped deltas, open-face double rectangles (also called open double magnetic slot antennas), and double half-squares (called bobtail curtains). Each has a tale of its own to tell.

The Double Right-Angle Delta. **Figure 3** illustrates the design and resonant dimensions of a double right-angle delta cut for 3.6 MHz.[4] The single right-angle delta is shown for comparison. Very little difference exists between the dimensions of each of the double's two triangles and the one triangle of the single delta.

The key difference lies in the position of the feedpoint. Where the two triangles would meet in the middle, the feedpoint is placed between the baseline and the lowest point of the triangles' upper wires. Due to the balance within the overall system, horizontal radiation does not radically increase relative to that within a single delta with optimal feedpoint placement. Moreover, the feedpoint is compatible with a coaxial feed system.

Other differences emerge from a comparison of the performance at various heights of the single and double right-angle deltas. **Table 2** compares the antennas between 10-foot and 70-foot baseline heights over average soil. Two data point stand out. First, a properly constructed double delta is capable of almost 2 dB gain over a single delta. Second, the baseline height for maximum gain is much lower for the double delta than for the single—some 30 feet lower. However, this extra gain and lower height requirement are purchased at the price of an antenna nearly 240 feet long that requires at least two high support points. Whether or not this defeats the value of the delta, whose single-hump version requires only one high support point, is a builder judgment.

The Double Open Rectangle. K4VX brought the double open magnetic slot—or the double rectangle, for simplicity—to

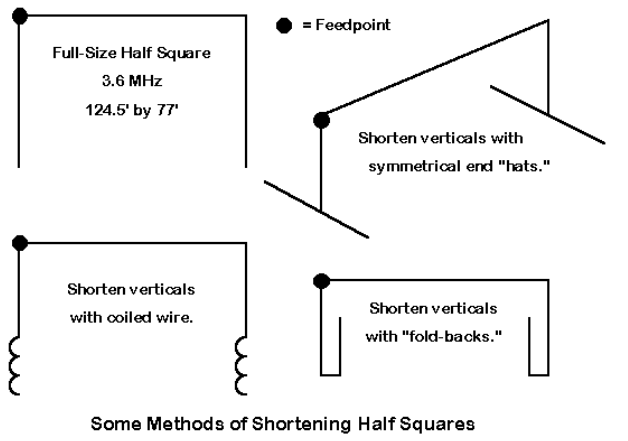


Figure 2—Some methods of shortening half-squares.

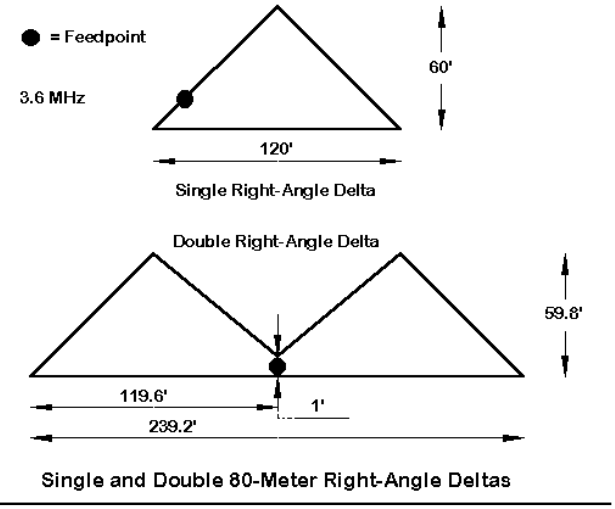


Figure 3—Single and double 80-meter right-angle deltas.

amateur antennas most recently.[5] When optimized for gain in free space, the dimensions shown in **Figure 4** are best for 3.6 MHz. The free space gain for the double rectangle was 5.5 dBi, compared to about 5.0 dBi for the double delta. The half-dB advantage of the double rectangle also shows up over ground, as the figures in **Table 3** demonstrate. However, the double rectangle requires considerably more baseline height to achieve maximum gain than the double delta. At a height of 20 feet for the baseline of each, performance is quite similar. Compared to the single rectangle, the double rectangle shows a gain advantage of about 1.5 dB, which is also 1 dB higher than the K5RP double-wire rectangle reviewed in an earlier episode.

With dimensions of the rectangle optimized for gain, the preferred feedpoint position is at the center of one end of the assembly. At the height of maximum gain, the feedpoint impedance is about 53 Ω, whereas the impedance of the antenna if fed on the center wire is only about 17 Ω.

The double open rectangle is about 208 feet long, some 30 feet shorter than the corresponding double delta. Moreover, it is over 30 feet shorter in height. Thus, the high point for maximum gain installations of both antennas is quite similar (about 80 feet), even though the baseline of the rectangle needs to be higher.

The Bobtail Curtain. Of all the double SCVs, the bobtail curtain has the highest gain.[6]

With the gain-optimized dimensions shown in **Figure 5**, the antenna has a free space gain of over 6.4 dBi. The gain also appears over ground, as shown in the figures in **Table 4**. The gain is well over 1.5 dB higher than for the half-square and a full dB higher than for the double open rectangle, when each is placed at the correct height for maximum gain. In fact, with the maximum gain of the bobtail appearing over average soil at a minimum height of 15 feet or so, the maximum required height is once more about 80 feet above ground. (In other words, all three double SCVs require about the same upper height to achieve maximum gain.)

Unlike the other double SCVs, whose dimensions are close to a simple doubling in length of their single SCV parents, the bobtail requires significant refiguring of the half-square dimensions. The dimensions optimized by modeling show a longer and lower antenna: about 296 feet long and 66.45 feet high. These figures are close to the proportions recommended by SM4CAN, as cited in ON4UN's book.[7] For the added length, one acquires nearly 4 dB gain over a single full-size equilateral delta at its optimum height.

Feeding the bobtail is best done at the center wire. The high impedance base point of the wire can be fed via a parallel tank circuit. However, the impedance at the center of the wire is close to a coax match. If the height of the antenna yields too high an impedance at this point, one can simply select a higher point on the wire. With the model shown at the height for maximum gain, the top of the center

Table 2
A Comparison of Single and Double-Humped Right-Angle Delta Loops

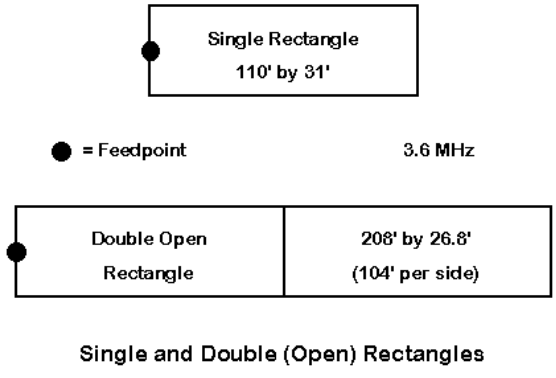
	Single Right-Angle Delta			*Double Right-Angle Delta*		
Height (in feet)	*Gain (dBi)*	*TO (deg)*	*Feed Z (R+/-jX)*	*Gain (dBi)*	*TO (deg)*	*Feed Z (R+/-jX)*
10	1.63	24	97+*j*42	3.97	23	54+*j*22
20	1.94	22	81+*j*12	4.08*	22	47+*j* 8
30	2.08	20	71+*j*1	4.04	20	43+*j* 3
40	2.14	18	63-*j* 4	3.97	18	40-*j* 0
50	2.15*	17	57-*j* 5	3.89	17	37-*j* 2
60	2.09	16	53-*j* 4	3.79	16	35-*j* 2
70	1.96	15	50-*j* 2	3.66	15	33-*j* 1

Note. Full-size right-angle loop: 120-foot baseline, 60-foot height; double right-angle loop: 242-foot baseline, 60.5-foot height. All antennas: #12 AWG copper wire. Height entry: baseline height above ground. Design frequency: 3.6 MHz. All antennas over average soil (C=0.005 S/m; DC=13).

Table 3
A Comparison of Single and Double Rectangular Loops

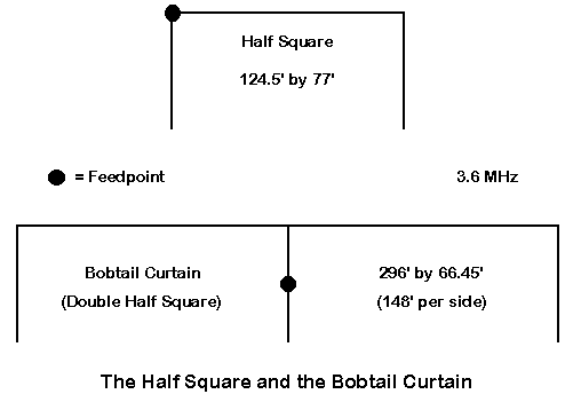
	Single Rectangle		*Double (Open) Rectangle*			
Height (in feet)	*Gain (dBi)*	*TO (deg)*	*Feed Z (R+/-jX)*	*Gain (dBi)*	*TO (deg)*	*Feed Z (R+/-jX)*
10	2.21	25	50+*j*38	3.72	25	109+*j*57
20	2.76	23	40+*j*15	4.23	23	81+*j*15
30	2.98	21	34+*j* 7	4.44	22	68+*j* 0
40	3.08	20	30+*j* 4	4.53	20	59-*j* 5
50	3.11*	18	27+*j* 2	4.56*	18	53-*j* 7
60	3.08	17	25+*j* 2	4.54	17	48-*j* 7
70	3.01	16	23+*j* 2	4.46	16	45-*j* 6

Note. Single rectangle: 110 feet long, 31 feet high; double rectangle: 208 feet long, 26.8 feet high. All antennas: #12 AWG copper wire. Height entry: baseline height above ground. Design frequency: 3.6 MHz. All antennas over average soil (C=0.005 S/m; DC=13).



Single and Double (Open) Rectangles

Figure 4—Single and double open rectangles.



The Half Square and the Bobtail Curtain

Figure 5—The half-square and the bobtail curtain.

wire shows an impedance of about 33 Ω. Hence, between the top and the center, there is a good coax matching point for almost any installation.

A comparison of azimuth patterns—each at the elevation angles of maximum radiation when the antenna is set at the height for maximum gain—can reveal something further about the differences among the double-wide SCVs. See **Figure 6**. As the gain of the double-wides increases, the side-rejection also increases. In its maximum gain configuration, the bobtail actually begins to show a side "bulge" in its pattern. For maximum side rejection, the bobtail can be made slightly taller and less lengthy, if a little less gain is acceptable.

Table 4
A Comparison of the Half-Square and the Bobtail Curtain

	Half-Square			*Bobtail Curtain*		
Height (in feet)	*Gain (dBi)*	*TO (deg)*	*Feed Z (R+/-jX)*	*Gain (dBi)*	*TO (deg)*	*Feed Z (R+/-jX)*
5	3.75	20	81+*j*19	5.38	21	75+*j*39
10	3.79*	19	75+*j* 8	5.45	20	68+*j*22
15	3.79*	18	71+*j* 2	5.47*	19	64+*j*12
20	3.76	18	68-*j* 0	5.45	18	61+*j* 7
25	3.71	17	66-*j* 1	5.42	18	58+*j* 3
30	3.63	16	64-*j* 3	5.36	17	53-*j* 2

Note. Half square: 124.5 feet long, 77 feet high; bobtail curtain: 296 feet long, 66.45 feet high. All antennas: #12 AWG copper wire. Height entry: baseline height above ground. Design frequency: 3.6 MHz. All antennas over average soil (C=0.005 S/m; DC=13).

Twins

The SCV double-wides provide a foundation for higher gain bi-directional arrays on the low HF bands. The cost is longitudinal landscape. The beamwidth between –3 dB points grows narrower with increased gain, and side rejection increases. Depending upon operating needs, these features may or may not be advantages.

Where a higher degree of directionality is needed, one can press the SCVs into parasitical service with fair ease. Deltas will show a directional pattern with some front-to-back ratio and a little gain, and they may be placed at angles sloping from a cross bar placed near the top of a single existing tower. However, the most improvement occurs when one moves up to the half-square, and we shall use this SCV as the basis for these notes.

Figure 7 sketches a feasible 2-element parasitical beam for 3.6 MHz. One useful guideline for half-square beams is to leave the horizontal length of the two elements the same (and to place them at the same height). Adjust the beam properties by altering the lengths of the verticals. In the sketch, the spacing was chosen for convenience: 30 feet provides a feedpoint impedance that varies between 50 and 55 Ω as the bottom height of the antenna is raised from 13 to 23 feet (top height range: 87 to 97 feet). A wider spacing would add some gain to the array.

The forward gain of the beam over ground is about 6.7 dBi in the favored direction, with about 18 to 23 dBi front-to-back ratio, depending upon height. These figures are for an elevation angle of maximum radiation that runs between 17 and 18 degrees. The beamwidth is about 65 degrees between –3 dB points.

With vertical legs of different lengths, the beam just described is fixed in one direction. The beam becomes reversible if we make both the driven element and the reflector legs the same length. By adding a shorted stub of 50-Ω coax to the reflector (about 25 feet for this particular array), as shown in **Figure 8**, the beam produces the same range of feedpoint impedances, the same range of front-to-back ratios and the same gain (within 0.1 dB) as the beam in **Figure 7**. Since the stub may be brought to a center point between the elements, twin stubs may run from each element. With simple switching of both the center conductor and the outer braid, one line becomes a shorted stub and the other becomes just a part of the feed system for the beam. The result is a reversible beam.

If the builder prefers, he can use appropriate lengths of open-ended transmission line to place the stub junction point closer to the ground. Even shorted stubs longer than $^1/_2$ wavelength can be used for a ground-mounted junction box. However, the longer the stub, the greater its losses, resulting in a little loss of front-to-back ratio (mostly). Alternatively, the beam can be fed with parallel transmission line, with the stubs cut to suit the higher impedance, higher velocity factor line.

Parallel transmission line becomes more attractive as a feed system for those who wish to operate over large regions of the band. The 80-meter model shows a fairly small frequency range for

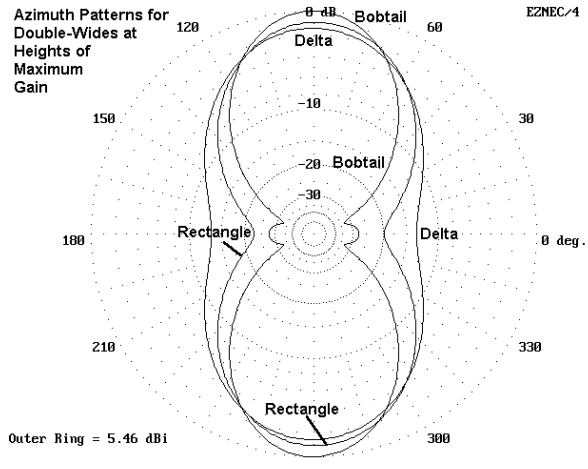


Figure 6—Azimuth patterns for double-wides at heights of maximum gain.

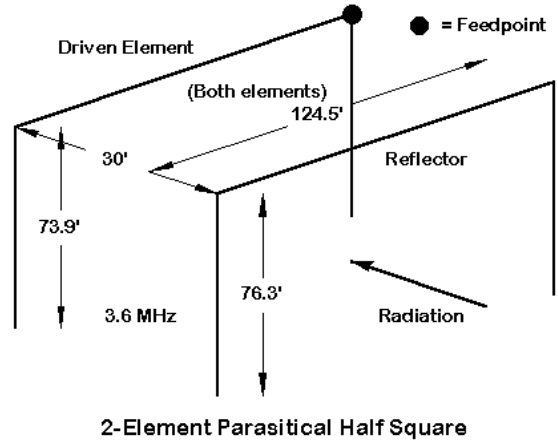
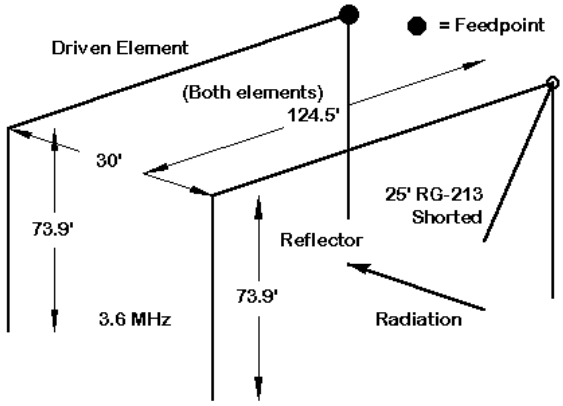


Figure 7—A 2-element parasitical half-square beam.



2-Element Parasitical Half Square
with Stub Reflector Loading

Figure 8—A 2-element parasitical half-square beam with stub reflector loading.

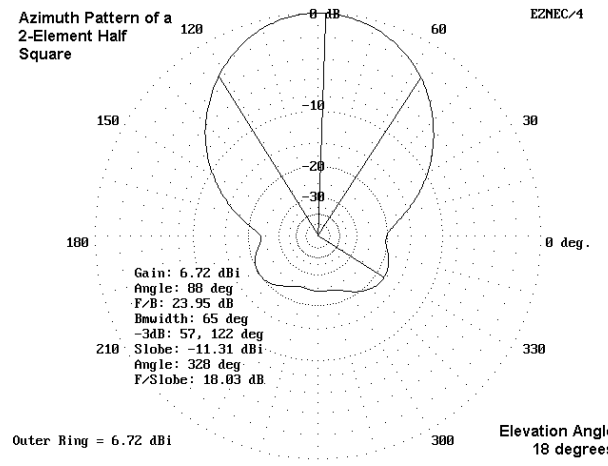


Figure 9—Azimuth pattern of a 2-element half-square beam.

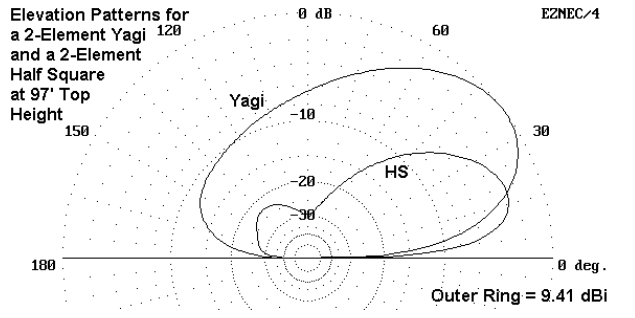


Figure 10—Elevation patterns for a 2-element Yagi and a 2-element half-square at 97 feet.

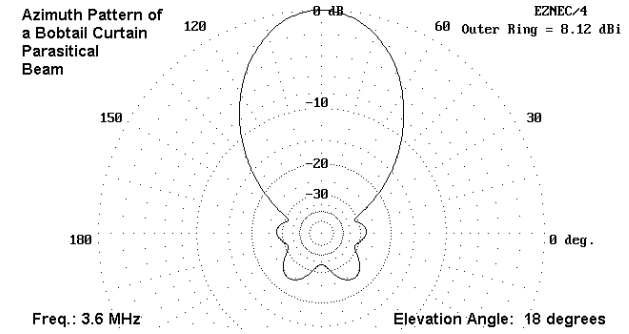


Figure 11—Azimuth pattern of a 2-element parasitical bobtail curtain beam.

good beam properties. Parallel transmission line to an ATU allows use of the antenna across the entire band, with beam properties set for some "special" segment. Moreover, with only a little more complexity, the reversible beam can be configured for phased feeding to change the properties of the resulting field.

Since the half-square is fed at one corner, the azimuth pattern will be slightly tilted, as shown in **Figure 9**. The two-degree difference in the forward direction is less likely to be noticed than the differential to the rear.

With a maximum gain of about 6.6 to 6.7 dBi over average soil, the advantages over a standard wire Yagi may not be immediately apparent. A wire Yagi will have dimensions fitting wholly within the width of the horizontal portion of the half-square, without the need for vertical legs. When placed at the same height as the half-square top wire, the Yagi will show up to 9.4 dBi gain.

Figure 10 shows a comparison between the elevation patterns of the Yagi and the corresponding pattern of the half-square beam. The SCV beam shows low angle radiation several dB stronger than the horizontal Yagi. However, perhaps the real advantage of the SCV beam for DX work is most apparent where the Yagi shows high gain and the half-square beam shows little or none. The SCV not only rejects signals to the rear by 10 dB more than the Yagi, but as well the forward lobe is relatively unresponsive to high-angle signals above 30 degrees elevation.

For those with acres of open land or those who simply like to dream of large wire arrays, the bobtail curtain is also open to treatment as a parasitical beam.[8] Using the horizontal dimensions of **Figure 5**, we can cut driver verticals to 64.4 feet and reflector verticals to 66 feet to obtain a 30-foot spaced array with some remarkable properties. With a top height of 81.5 feet (plus or minus a bit), we obtain the azimuth pattern of **Figure 11**, with a 50-Ω feedpoint impedance if the center leg is fed at the middle of its vertical length. With a gain of over 8 dBi at a low angle and a worst-case front-to-rear ratio of about 25 dB, the antenna is highly directional. Its narrow 44-degree beamwidth does suggest application in specific directions rather than more general operation. The bobtail beam is susceptible to reversibility in a manner similar to that used with the half-square.

Summing Up

In this final installment, we have only been able to illuminate the highlights of supplementary techniques in getting the most out of SCVs—whether within restricted areas or heights, or with the aim of getting the most performance from the SCV possibilities. If the series has answered some questions about SCVs, it has opened the door to myriad others.

Remember that in our modeling look

at each of the SCV types, we discovered that we cannot automatically scale an antenna from one band to another and expect the same performance or feedpoint impedance. The antennas in this episode have been optimized by modeling for 3.6 MHz and may require considerable adjustment for use on 160 or 40 meters. Anyone considering anything more than casual experimentation with SCVs should invest in one of the *NEC* programs available to develop some initial guidance for both the feasibility and the construction phases of the enterprise.

Moreover, even with the best approximations of local soil type, construction always requires significant field adjustment, both of the antenna and of any special feed system used with the antenna. SCVs require not only a bit of real estate, but as well, a good dose of patience. Modeling can provide some detailed preliminary guidance and systematic information about antennas, but it can never install a support tower, hang a wire, or make final adjustments.

However, if this series has helped you understand the basic properties of the family of SCVs—with regard both to their similarities and to their unique individual personalities—then it has done what modeling does best.

Notes

[1]John Devoldere, ON4UN, *Antennas and Techniques for Low-Band DXing*, 2nd Ed. (Newington: ARRL, 1994). See Chapter 10, pp 10-14.

[2]For notes on the functional equivalence of double-wire and single-wire end loading, see "Modeling and Understanding Small Beams: Part 7: Shrunken Quads," *Communications Quarterly* (Summer, 1997), pp 71-92. See also the work of Frank Witt, W1DTV (now AI1H), "Top-Loaded Delta Loop Antenna," *Ham Radio* (December, 1978), pp 57-61.

[3]See, for example, Walter Schreuer, K1YZW/G3DCU, "The Top-Loaded Delta Revisited," ("Hints and Kinks"), *QST* June, 1998, pp 59-60.

[4]John Devoldere,ON4UN, *Antennas and Techniques for Low-Band DXing*, 2nd Ed., p 12-12. The dimensions shown in Figure 12-15 are for 3.8 MHz.

[5]Lew Gordon, K4VX, "The Double Magnetic Slot Antenna for 80 Meters," *The ARRL Antenna Compendium*, Vol. 4 (Newington: ARRL, 1995), pp 18-21.

[6]Woodrow Smith, W6BCX, "Bet My Money on the Bobtail Beam," *CQ* (March, 1948), pp 21-23 and 92-95. See also Smith's follow-up articles, "The Bobtail Curtain and Inverted Ground Plane," Parts 1 and 2 in *Ham Radio* (February, 1983), pp 82-86, and (March, 1983), pp 28-30.

[7]John Devoldere,ON4UN, *Antennas and Techniques for Low-Band DXing*, 2nd Ed., p 12-13.

[8]A 2-meter bobtail beam design (along with half-square designs using 2 and 3 elements) will appear in a forthcoming issue of *Communications Quarterly*. ■

Using Less-Common Propagation Modes to Work Multipliers—*Part 2*

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In Part 1 of this series, propagation via auroral-E was discussed. In this installment we'll have a look at propagation via scatter.

Several of us were doing a multi-operator effort at the Ft Wayne station of K9UWA during the CQ World Wide Phone DX Contest in October 1996. My second operating shift started early Sunday morning on the multiplier station. The run station was on 20 meters, so I started looking for multipliers on 15.

After seeing numerous 10-meter spots on packet, I decided to move to that band around 1400Z (9:00 AM local time) and started working South American and Caribbean multipliers. Around 10:20 AM CT4NH was spotted. I swung the 10-meter antenna to the northeast and was able to put him in the log. He was weak, but workable.

I turned the antenna back to the southeast to work more South American and Caribbean multipliers. Around 10:35 AM EA7EZ was spotted. I swung the antenna back to the northeast, but he was too weak to work. On a hunch, I swung the antenna back to the southeast, and there he was—a little stronger and workable. Soon he was in the log, too.

Why did the pointing the antenna southeast allow me to work the EA7? Did something happen to K9UWA's 10-meter antenna after the CT4 QSO to cause the pattern to distort 90 degrees? Nope, his antenna was working correctly—I worked him via *scatter*.

For this contest in October of 1996, the smoothed sunspot number was around 15—it doesn't get much lower than that. It was obvious from the very weak CT4 signal that the true short path from Ft Wayne to the northeast (Western Europe) was very marginal.

Figure 1 shows the MUF (maximum usable frequency) for a hop distance of 3000 km at 10:30 AM (1530Z) in October 1996 with an SSN of 15. Three paths are included on the figure—the short path from Ft Wayne to CT4/EA7, the short path from CT4/EA7 to the Caribbean, and the short path from Ft Wayne to the Caribbean.

Note that the MUF along the Ft Wayne to CT4/EA7 path is about 21 MHz. That is too low to support 10-meter propagation on a regular basis. The only reason my CT4 QSO along this path was completed is because 21 MHz is a monthly median value, and the actual MUF at that particular time could be high enough to support 10 meters. Compare this 21 MHz MUF to the MUF for the Ft Wayne to Caribbean path (about 23 MHz) and the Caribbean to CT4/EA7 path (about 27 MHz). The median MUFs along these paths are certainly higher. They are higher because they are closer to the equatorial region.

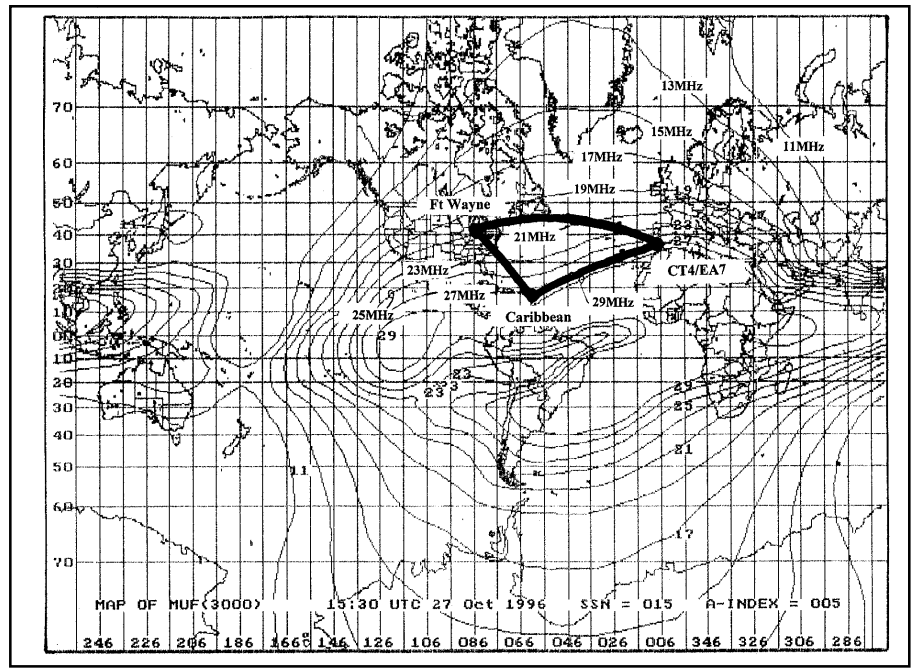

Figure 1—Contours of 3000 km MUF for October 1996 at 1530Z.

This says 10-meter energy has a better chance of getting from Ft Wayne to CT4/EA7 via the Caribbean than going along the true short path. All that is needed is some mechanism for the energy to scatter somewhere in the Caribbean. This typically occurs by three mechanisms—scatter from an irregular land surface, scatter from a rough sea surface, or scatter from an ionospheric irregularity. I guess it doesn't matter which one was responsible, as long as it happened!

Another good example of scatter is observed when working JAs on 10 meters during a sunspot minimum with the antenna pointed southwest. The MUFs along the short path (to the northwest) to JA are not high enough, but the MUFs to the Pacific and then from the Pacific to JA are much higher. Several Midwest stations took advantage of this propagation mode in the 1997 CQ WW SSB contest by working JAs with their antennas pointed towards the Pacific.

So keep your eyes and ears open for unusual scatter paths. By thinking: "*Turn the antenna toward the equator*," you may be able to take advantage of another mode of propagation that your competition isn't even aware of. ■

All Time ARRL Field Day Records

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Although Field Day is generally not considered a contest, for many of us, it served as our initial exposure to "running" stations. It is no surprise that many contesters annually jump into Field Day with the same zeal they expend for SS or the DX contests. This record list is certain to stir up some active planning for the 1999 ARRL Field Day. Six records fell in 1998. How many will see new ownership in '99?

The listing shows class, call sign, the year the record was set, club or group name, total QSOs, power level (5 = less than 5 W, 2 = less than 150 W, 1 = more than 150 W), number of operators, and the total score.

Class	Call	Year	Name	QSOs	Power	Ops	Score
1A battery	WA1U	95	Above All Mtn Contest Team	1173	5	10	10960
1A	N5RR	92	Albuerque DXA	2870	2	28	8550
2A battery	K0NA	88	Arapahoe RC	2266	5	28	17295
2A	KP2N	93	Virgin Islands ARC	5252	2	16	15580
3A battery	K4HAV	84	Chekaw ARS	1629	5	17	18610
3A	K5DX	84	Texas DX Society	3756	2		17194
4A battery	WB8JBM	83	Northern Ohio ARS	2029	5	127	17345
4A	W3AO	98	Potomac Valley RC	6697	2	15	19366
5A battery	W3VPR	84	Anne Arundel RC	2495	5	49	26570
5A	K5DX	88	Texas DX Society	7151	2	27	19836
6A battery	NA4G	91	Raleigh ARS	1340	5	30	11270
6A	W4AT	95	Orlando ARC	4735	2	71	15434
7A battery	W4DW	89	Raleigh ARS	1236	5	12	11215
7A	W6TRW	93	TRW ARS & Xerox ARS	5217	2	55	15474
8A battery	N6WG	93	Alameda County Rpt Club	1205	5	35	9815
8A	N6ME	89	Western ARA	5390	2	55	14772
9A battery	VE3NAR	95	Nortown ARC	1105	5	30	7930
9A	W4IY	98	Woodbridge Wireless	6217	2	56	18834
10A	W4IY	85	Woodbridge Wireless	5067	2	67	15474
11A battery	VE3NAR	97	Nortown ARC	1170	5	36	9465
11A	W4IY	90	Woodbridge Wireless	4669	2	60	14688
12A	W4IY	88	Woodbridge Wireless	4791	2	55	13646
13A	N1NH	91	Nashua Area RC	5325	2	100	15906
14A battery	AA6CV	97	Conejo Valley ARC	1246	5	55	10795
14A	N1NH	94	Nashua Area RC	5930	2	103	18710
15A battery	K6CAB	88	Conejo Valley ARC	2920	5	34	21015
15A	N1NH	93	Nashua Area RC	5669	2	100	17322
16A battery	AA6CV	98	Conejo Valley ARC	1501	5	45	12840
16A	WY8M	94	Utica Shelby ECA	5917	2	295	21468
17A battery	K6CAB	89	Conejo Valley ARC	3119	5	40	23685
17A	WY8M	95	Utica Shelby ECA	3654	2	250	14006
18A battery	K6CAB	90	Conejo Valley ARC	2569	5	30	21275
18A	K4GSO	88	Silver Springs RC	2502	2	36	8642
19A battery	KK8M	98	VSECA	2233	5	177	18650
19A	K2AA	86	South Jersey Radio Assn	4320	2	65	13178
20A battery	N6UNX	95	Conejo Valley ARC	1533	5	50	13710
20A	N1NH	96	Nashua ARC	6738	2	85	21756
21A	W2RJ	76	Englewood ARA	2845	2	55	10186
22A battery	AD6T	91	Conejo Valley ARC	2962	5	52	23500
23A battery	K5DX	89	Texas DX Society	3326	5	28	25260
23A	K2KX	78	Englewood ARA	2666	2	40	9380
24A	N1NH	95	Nashua ARC	6209	2	95	21648
25A battery	K6CAB	92	Conejo Valley ARC	2343	5	62	20255
26A	N1FD	98	Nashua ARC	8744	2	87	26274
27A	N1NH	97	Nashua ARC	6768	2	87	22080

Class	Call	Year	QSOs	Power	Ops	Score
1B-1 battery	KW8N	95	945	5	1	8975
1B-1	W8TK	96	1460	2	1	6586
1B-2 battery	KW8N	96	907	5	2	8700
1B-2	W6UE	93	2097	2	2	7412
2B-1 battery	N6VT	93	449	5	1	5135
2B-1	N6ZPX	93	747	2	1	2526
2B-2 battery	KW8N	91	1148	5	2	8915
2B-2	W2GD	88	2560	2	2	8814
3B-1	W9WI	89	56	2	1	738
3B-2 battery	KW8N	97	962	5	2	8695
3B-2	K5TA	93	2137	2	2	7000
4B-2	KW8N	98	1720	2	2	6040
5B-2	W8TQE	89	272	2	2	1212
1C	WA4VRN	91	934	5	1	8080
2C	N6BT	80	1885	2	3	4912
3C	WB4GQX	76	836	2	3	2162
4C	AC4OG	92	389	2	24	792
5C	AB3A	80	694	2	8	1696
6C	VO1AA	78	30	5	8	715
1D	K7UP	97	1490	2	1	5596
2D	K2FW	78	2831	2	5	7586
3D	K1AR	78	3825	2	6	8928
4D	N6TV	92	2253	2	17	5708
5D	W1AW	91	1650	2	6	4726
6D	W1AW	95	3200	2	16	9290
7D	W1AW	94	2890	2	7	8820
8D	KC4ZFX	93	1490	2	8	4388
9D	N6OP	91	2849	2	22	8206
1E	KR0B	88	1525	5	3	11490
2E	KR0B	89	2000	5	5	13975
3E	K1AR	77	3641	2	4	8964
4E	NC0P	96	3702	2	8	10318
5E	K5DX	83	6019	1	50	7987
6E	W0AIH	95	5040	2	10	12514
7E	W0AIH	96	4170	2	8	10292
8E	WU8A	95	1963	2	21	6474
9E	W8VND	98	1634	2	19	4192
13E	AA5EQ	90	235	2	7	554
15E	K9GL	82	8179	1	25	10541

Kid's Day, the Non-Contest Contest

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What were you like in your first few contests? Aggressive? Shy?—thrilled at making every Q or bored with the action provided by your little pistol antennas? Read about Kid's Day, then check out the Soapbox. You may see your youthful self! Or you may see what you'd like for your daughter, son, grandkid, their cousins or the neighbor's kids.

Several years ago the Boring (OR) Amateur Radio Club started Kid's Day—where friendly QSOs rule the day. The exchange is easy—name, age, location and favorite color. Kid's Day isn't a contest. It's up to the participants to decide whether they'll make one QSO or hundreds during this six-hour activity. The kids ask whatever questions they think up. They may decide to take lots of breaks. Kids require that you keep your patience handy—don't correct them. For those kids who are not licensed, you can take on the role of control op—make sure your station is IDed when needed, and that third-party traffic rules are followed. If a kid is licensed, and doesn't need your assistance, that's great. If he or she has yet to earn HF privileges or wants to expand their band limits, you can certainly step in as a control op for them as well.

A kid's attention span is not much over 20 minutes. If no one answers their CQs, they won't call CQ for very long. Don't act disappointed. Tell them you'll listen for awhile and give them a call when things begin to hop. Even if they only manage to make one QSO, they'll still remember they had a good time with a ham that invited them to join the fun. That's what really counts! Remember—you may be laying the foundation for a future contester, so make it a good one!

Kid's Day Rules

Purpose: Kid's Day is intended to encourage young people (licensed or not) to enjoy Amateur Radio. The goal is to give young people some hands-on experience on the air, so that they might develop an interest in pursuing or upgrading their license in the future. It is also intended to give hams a chance to share their station with their own children.

Date: June 19, 1999.

Time: 1800 to 2400Z. No limit on operating time.

Suggested exchange: Name, age, location and favorite color. You are encouraged to work the same station again if either operator has changed.

Call "CQ Kid's Day."

Suggested Frequencies: 28350 to 28400 kHz and 14270 to 14300 kHz.

Be sure to observe third party traffic restrictions when making DX QSOs.

Reporting: Logs and comments may be posted via the Internet to **kids@contesting.com**. You may review these postings at **http://www.contesting.com/kids/**. Those without Internet access may forward comments to the Boring Amateur Radio Club. A summary of the postings will also be sent with your participation certificate.

Awards: All participants are eligible to receive a colorful certificate.

Send a 9 × 12 SASE to the Boring Amateur Radio Club; PO Box 1357; Boring, OR 97009. More details may be obtained from the Boring club at this address or on the Web at **http://www.jzap.com/k7rat/**.

Soapbox from Previous Kid's Days

John and I had a great time—he worked 46 stations (26 states) in 2.5 hours! He talked; I logged. John is 5 and these were his first contacts on the radio. By the end he was almost doing it all himself (no coaching). He is anxious for the next Kid's Day. It was fun to listen to the next generation of contesters. Some of the older kids were pretty serious and will be in the box scores soon! Congrats and thanks to all who participated.—*John and Mike Fatchett, W0MU*. Doug was really looking forward to Kid's Day this time. He was after me several times about when it was, whether he was going to be able to run the amp, were all the antennas going to be available, etc. He did the running and I did the logging. He usually likes to start off with "hunt and pounce." This time he wanted to jump right into running. He ran about 30 stations in the short time we had. Several times the QRM was really bad and I asked if he wanted to find a clearer frequency. No way! The last Kid's Day, someone took his run frequency from him. He wasn't going to give it up this time without a fight! He hung in there and was actually pulling them out rather well. The last contact was one of the toughest for him (and me) to copy. He finally got it right after just a few repeats. He was pretty happy (and surprised) that Australia called him! See y'all again next time.—*Doug and James Setzler, K1SD*. We only had about 1.5 hours to get on the air, but had fun anyway. Bryan enjoys these contests, and is working on his own license.—*Bryan and Al Gritzmacher, AE2T*. My oldest daughter (Rachel, age 8) really got going this time. She is normally shy, but after S&Ping for 3 QSOs, she wanted people to come to her. We found a frequency and she called CQ. She said, "Now we wait until they start calling." I had to give her the thought that if she is not talking, how does anyone know she is there? She got CQing again, but this time without a pause. She ran 13. My youngest daughter (Erica, 5) is a low communicator, but was getting a little interested listening. I found a loud station (K7SJ) while she was there, and she said she would talk. She gave her information and it was acknowledged the first time. Repeating the kids' name back to them is a great boost. We'll see you again.—*Rachel, Erica and Dan Violette, KI6X*. We tried calling a few stations without success so decided to call CQ. We were immediately answered by NM5M and I knew we were going to be all right. This was Andrew's first real QSO and it was even better since he got to talk to two girls his same age. Thanks Eric! You can always count on the contest guys to be in the right place and loud! Andrew was shy and mumbled his way through the first few QSOs. Once he discovered the Heathkit monitor scope he started talking louder (to make the lines bigger) and he was much easier to understand (there's a tip for future kid operations!). We only operated 25 minutes before he grew tired of the game. Thanks for the QSOs. Andrew is still talking about it so I'm sure we will be back. When he related the events to my wife, he was just as excited (and remembered all the details) of the QSOs with the adults as much as the kids. That tells you the whole event was a good thing!—*Andrew and Randy Thompson, K5ZD*. My daughter and I both had a great time in the contest. She got 6 states and is looking forward to the next time. She is also interested in getting her ticket.—*Stephanie and Kenny Sanchez, KG2FH*. I decided to invite my unlicensed friend John over to operate, watch and learn about contesting. He has never been around ham radio and knew little about it except seeing the rig and the antenna. He arrived and I turned on the rig and computer and explained how everything worked. I spent the first 15 minutes doing "drill" QSOs where he called CQ, I made up a call and answered him, and he gave me the exchange back. I made the first 12 contacts and let him

watch and log what he could. (I kept a backup paper log.) Finally, he wanted to try it while I logged. I wrote what he was supposed to say on a piece of paper and taped it up. He called CQ several times, and finally got his first contact. He made five more and wanted me to take it back. After that, we passed it back and forth. He is just like I was at first; I hated to talk on the microphone. Several more contests and that will be gone...—*Jason Goldsberry, N5NU (age 16) and John.* Great idea! I had both my boys in the shack for about 2 hours. We made 45 contacts apiece, and we all loved it. They are age 12 and 10. It was the best 2 hours I have spent in the shack in a LONG time. We will be sending for certificates. It was great hearing OMs and YLs coach the kids through their reports. As the day got longer, we could hear the kids get more at ease and sound like old hams.—*Alex, Jack (hams in the making) and Henry Gillow-Wiles, KB7RTA.* N6QU's kids, Charles (age 10) and Catherine (age 13) came over for a few hours. They got started on the air late because they brought a box of 96 crayons, and there was a complicated selection process to determine favorite colors. Charles used our local club call, K7YA. He's the author of *Charlie's Field Day Hints*, which appeared in *NCJ* last year, so he is an experienced contest operator and burned up the band with 39 Qs in 55 minutes. Charlie's choice of gold was a definite advantage; one little girl said "Oooohh!" when she heard the word gold. After Charlie bugged out, it was Catherine's turn, using the fresh call sign N6QU, to make sure everyone realized it was a new operator at the controls. Using an old Sweepstakes psychological trick, she started off her log sheet at number 40, so everyone would think she was hopelessly ahead. The operator at WQ5G (John, age 4) insisted that his color was geen, not green, which sparked considerable debate on the frequency regarding the ethics of that tactic, speeding up his exchange by leaving out certain letters. When the dust had settled, Catherine had clicked off 48 QSOs in 56 minutes. Once she saw she had safely eclipsed her brother's QSO total, she threw down the microphone and went to the kitchen for a Pepsi victory celebration. Catherine said she'd be back for Field Day so she can stay up beyond her regular bedtime. Great fun!—*The kids and Dave Hachadorian, K6LL.* Missed QSO: I never could break through the pile-up to work Andrew, age 7, who was operating the radio at K5ZD. I was listening to his first ever QSO—what a pleasure! I could hear who I presume to be Randy in the background offering coaching and encouragement. You could hear the pride in his voice! See you next time. —*Scott Tuthill, K7ZO.* ■

The Microstation—V63X

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We seem to have a nearly endless supply of contest DXpedition stories from the Caribbean. Most NCJ readers are by now familiar with the challenges...and pleasures...one can expect to encounter when operating from that part of the world. Paul, K1XM, now shares with us his tale of operating from Oceania; a story we are certain will reveal that our wandering contest operators experience an entirely different contest from the islands in the Pacific.

Sunspots! For the past two years Charlotte, KQ1F, and I had operated the CQ WW CW contest from Grenada as part of the J39A operation. That's a fine place to be when conditions aren't very good as it is reasonably close to the US and to Europe. But the scuba diving is better in the Indo-Pacific, and we enjoy taking a longer vacation further from home.

Micronesia

We expected that in 1998 conditions would be good enough that we could have fun operating from almost anywhere in the world. So we started to look for somewhere to go. We had been in Western Micronesia in 1989, operating the contest from Palau as KC6AA. Ever since then Eastern Micronesia was on our "hit list." This was going to be the year.

We spread the word locally and Ann, WA1S, said she wanted to go along. That was fine with us—she was with us on the 1996 J39A trip.

Three people meant Multi-single, which in the CQ contest means two stations, amplifiers, filters, networked computers and of course antennas.

The islands we wanted to visit—Kosrae, Pohnpei and Chuuk (Truk)—are all mountainous. We needed a hotel on the north side so that we'd have a clear shot to Europe, Japan and the US. I found only one hotel that met the requirements, the *Sandy Beach Hotel* on Kosrae.

Micronesia is a long way from anywhere. We planned to bring everything we needed and designed the station accordingly. Ann has a Kenwood TS-570D and I have an old IC-735 that I modified to work better on CW. I also have two small amplifiers, a Tokyo High-Power HL1K/A and a Collins 30L1 with 160 meters added.

I've had lots of experience with verticals near salt water over the years, most recently from the 9M6TPR/9M6TCR Spratlys operation and from various contests at W1KM's QTH. The 6Y4A operation proved that verticals could be winning contest antennas. We decided to go with a set of verticals on the beach.

We couldn't bring monoband verticals because the coax to all of them would have weighed too much. I looked at commercial multiband verticals for 20/15/10 but everything I found was too heavy. I decided to design some lightweight verticals. Stan, KA1ZE, helped me with the materials and Gus, W1OG, helped with construction. The complete full size elements weighed less than four pounds each.

We built four of these verticals to install as pairs, one set aimed northeast to the US and one aimed northwest towards Europe and Japan. John, W1FV, had modeled the antennas and concluded that the best way to set them up was as driven elements with parasitic reflectors.

For 40 and 80 meters we brought a pair of Butternut HF2V verticals. These would be aimed at Europe and could be switched to an omnidirectional configuration. We also packed a trapped inverted-L for 40, 80 and 160.

All of the aluminum, the radial wire and most of the RG-8X coax fit in one golf club carrying bag.

We arrived in Kosrae Saturday evening. Everything is closed on Sunday so we figured we'd install our antennas then. Unfortunately *Continental Air Micronesia* had other plans. They left all of our bags in Hawaii. There was no flight Sunday so we lost two days and some prepaid diving.

Our other problems were one rig's power supply, which died and could not be fixed, and a notebook computer that would not work properly with a PCMCIA serial card. We borrowed a power supply just before the contest, so we had both rigs, but the second station could not run at full power output. In fact, neither station could run more than about 400 W out.

None of this mattered. Conditions were excellent and the antennas worked well, except on 160—the palm tree that we used to support the trapped inverted-L wasn't tall enough. We had decent rates for most of the contest, nothing spectacular but averaging well over 100. (Ann and I consider anything less than about 120/hr to be slow.)

Our biggest challenge was Western Europe. The path to Europe is long and polar. We tried to catch whatever European openings there were, but it was tough. We worked EI, G, GI, GM, GW, OZ and PA only on 20 meters! We worked EA on two bands and F on three. DL was far enough east that we made QSOs on five bands. That should give you an idea of the size of the area we couldn't work into. Interestingly if you go a bit further west in the Pacific things reverse; the Eastern US becomes polar and Western Europe becomes much easier to work. This is why the Oceania records are set from KH2, KH0 and 9M6.

The Caribbean was, by comparison, an easy shot, except that we had to break the US pileups, and the stateside stations had a 5,000-mile advantage.

Keep in mind, of course, that nobody aims his or her antenna into the middle of the Pacific unless there is nothing else to work!

So where did we get our QSOs? Two countries provided the bulk of our contacts—2,101 with the US and 1,539 with Japan, We had 790 QSOs with the US on 10 meters. The openings were long and signals were good. The second highest was 556 with Japan on 20, which is what we ran in the middle of the day when the bands weren't open to Europe or the US. Canada was good for 106, Asiatic Russia for 180.

Our rates were good—our problem was working multipliers. Multipliers tend to come from Europe and the Caribbean with a few from Africa and South America. 6Y4A is about 8,000 miles. DL is also 8,000 miles away, and 5V7A is well over 10,000 miles. So what's close? Guam is only about 1,000 miles away. Hawaii is about 3,000 miles away. KH8/N5OLS is about 2,500 miles and FK is about 2,000. Banaba and Kwajalein are not far away but they're not exactly hotbeds of contest activity.

We did have some interesting openings. For example, at 1200Z on Sunday I was running 40 meters, mostly US with some Japan, when SK6AW broke the pileup, followed shortly by ES1QD and RW2F. On 20 meters our best East Coast opening was at around 0230Z. I heard some W1 stations so I went up in the band and tried calling CQ with little result. I figured I'd call a few big stations and then change to another band. I went to the bottom of the band and surprise; there was nobody there. So I called CQ on 14001 and quickly generated a pileup.

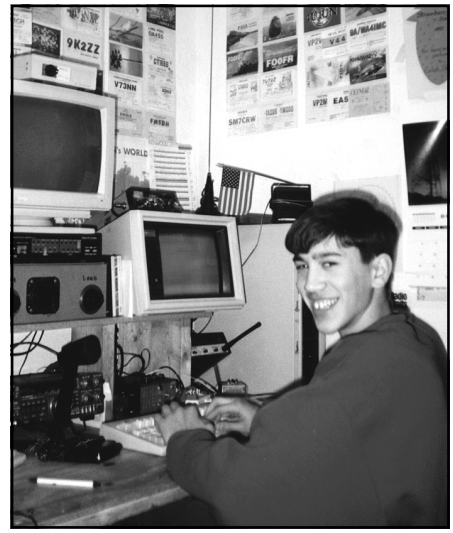
(Continued on page 27)

Young Contesters —the Promise of a Future

Dennis Motschenbacher, K7BV

So much has been said about contesting dying a slow death. Many, like me, refuse to accept this doomsday appraisal of our favorite activity within our hobby. I have seen and heard too many enthusiastic tales of new up-and-coming young hams who have found contesting to their liking. Being editor of the NCJ probably gets me exposed to only the Best of the Best new ops, which tells me there are additionally hundreds of other new operators (young and old) still working their way up the results standings towards higher visibility and recognition.

We found some new calls appearing in the recent NCJ Hot Picks. Some of those young rising stars are introduced below. We have more young contesters to introduce next issue. We hope that you, the readers, will help us identify others whom we may not yet be aware of.—K7BV



Caleb Skurdal, AD7U, age 15.

A New Contester on the Horizon—Caleb, AD7U!

Recently I was happy to catch Caleb Skurdal, AD7U, during a hiatus in the RTTY Contest. Caleb had just celebrated his 15th birthday and was going hot and heavy trying to crack some pile-ups in the upper 14080s.

Caleb got his start as a 13-year-old in San Diego with a Tech-Plus license—KF6AVD—in January 1996. Using borrowed rigs and operating from other stations resulted in only a few QSOs, but the interest in ham radio remained kindled. The Big Break came when his father—a naval officer—was transferred to the Whidbey Island NAS in Washington. The NAS has a world-class MARS Station and Caleb became one of the operators. He passed his General and joined the CW nets run by Phil, N7UX. Soon Caleb was sporting a new callsign, KK7JP—Advanced at the age of 14! Well, this was just whetting his appetite. He became an Extra in February '98 and received his "new" callsign, AD7U, in October of the same year.

His first contest was the IARU in '97. With his new "*pre-owned*" TS-440, he made 18 QSOs, 5 mults and 270 points. Numerous contests followed... Break a thousand, break 10K, break 100K. In the last ARRL 10M Contest, the score was 750+ QSOs for over 330K points. Over 500 QSOs per contest were also logged in the CQWW SSB and CW operating Single Band 20 meters. One particularly "gutsy" entry was running QRP in the ARRL 160M Contest! Caleb made 57 QSOs in that one using a wire up a 90-foot tree with a sheep fence counterpoise.

On the DXCC side—he recently received a QSL for this103rd country. He will be applying for his DXCC soon. His first DX QSO was with "Gentleman Jack," KH6CC, followed by ZL2GH. Now in the log are 9M0C, ZL7DK, 7Q7DC, A41LZ, A92GE and hundreds of others. Caleb has worked 200 DXCC countries within a year.

His antennas include a salvaged 10-meter 2-element quad, a wire 20-meter loop up a fir tree, a 40-meter dipole up the same tree and a sloper-longwire for 160 and the other low bands. Caleb is still running 100 W—fine tuning his operating skills with low power—and he certainly shows promise of being a gifted "Big Gun" operator within the coming years! Caleb is looking forward to joining a DXpedition or a serious team contest effort from ANYWHERE. Anyone need a contest op? His credentials are good—40 wpm CW and *fast* SSB.

—Prepared by Hillar Raamat, N6HR/7

From Brazil—Tom, PY2XE

Tom, PY2XE, was born on July 30, 1982. His first callsign, PY2MHB, was obtained in October 1994 when he was 12. There may be another callsign change coming—replacing PY2XE with PY2YU (more phonetics available, he feels!) He prefers CW, yet has done a fine job in several phone contests as well.

Tom is an avid DXer with a mixed DXCC of 272 worked/194 confirmed. His mode totals are 258/184 CW and 217/89 on SSB.

PY2XE won the "Verde Amarelo Contest" in 1998—his first presence in the contest. Verde Amarelo is one of the most important contests in Brasil. He has also posted some very impressive finishes in the following Brasilian national contests:

CWSP—1996/1997—Champion.
CW Group of Sao Paulo Contest.
CWJF—1995/1996/1997.
CW Group of Juiz de Fora Contest.
GPCW—1995/1996/1997.
Praiano CW Group Contest.

Tom has also enjoyed a lot of scoring success on the International contest scene, including:

ARRL DX Contest CW

1997 1st Brazil, 10th World All-Band Low Power.
1998 7th World, 1st Brazil Low Power Single-Band 15M.

ARRL 10-Meter Contest

1997 6th World CW, 1st Brazil.

CQWW CW

1995 2nd Brazil, Low Power All-Band.
1996 4th in World, 2nd in Brazil 15M Low Power.
1997 2nd in World, 1st in Brazil 15M Low Power.

CQWW SSB

1996 9th in World, 2nd in Brazil 10M Low Power.
1997 10th in World, 2nd in Brazil 10M Low Power.

WPX CW

1996 3rd in World, 1st Brazil AB LP —Low Power Rookie.
1997 4th World, 2nd South America and 1st Brazil 15M Low Power.
1998 3rd World at ZX5J M/S together with PP5BRV and PY2NY (claimed score).

WPX SSB

1996 1st World Rookie, first Brazil 10-Meter Low Power. 1997 - 7th World, third Brazil 10M Lower Power.

Tom uses a Kenwood TS-450S and the following antennas: 3-element Yagi 10/15/20 13 meters up (soon to be raised to 19 meters); 40-meter dipole 9 meters

up with a PY2EYE hand-made 2-element Yagi in the planning stages; an inverted-V 15 meters high and an 80-meter inverted-V 12 meters up.

—Prepared by Vitor Luis, PY2NY

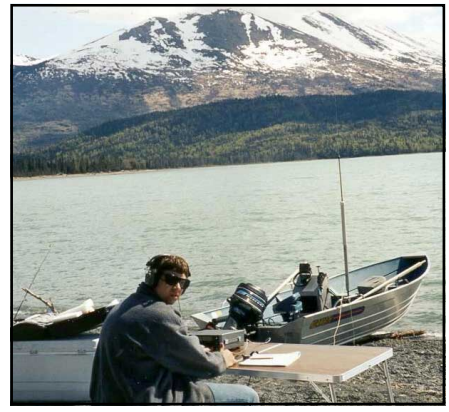
The Elusive Zone 1 KL7 Multiplier Finds Longevity in Chris Hurlbut, WL7KY—Anchorage, Alaska

Chris, who is 16 years old, grew up around Amateur Radio, and it has always been a natural part of life for him. That is one of the many benefits of having a father like Frank, KL7FH (formerly NL7HP and KL7HNU), who is active in many ham radio activities. Frank always made his ham radio activities available to his young son, encouraging him and supporting him, but also letting him find his own desire for the hobby.

When he was 10 years old, Chris got the urge to get his license, though he was not the least bit interested in CW. "Why would I want to use CW? It's stupid!" was a comment that Chris now views as a typical excuse from his early ham days. He got his No-Code Technician Class license so he could get on 2 meters and talk with his dad and other friends when they were out and about. At that time, Frank was doing a lot of satellite operating and Chris would hear him working stations in different countries, which seemed much cooler than just yakking with Dad and his buddies around town. Chris worked up his courage to make a satellite QSO (after much persuasion). He worked a DL, and a JA, then had a pile up! However, the fear of the microphone overcame the excitement and that ended his first foray into the lands of DX.

Eventually, local VHF operation became boring and his ham operations lapsed. A few summers later, while visiting his grandparents in Sequim (pronounced skwim), WA, he got the urge to learn the code. His grandfather, Frank, KE7MP (formerly KL7HHX), helped him. Using a computer program, and Gordon West's tapes, Chris studied for about one hour a day, for two weeks. By the time he went home to Alaska, he could send at about 20 wpm, and receive at about 8 wpm. With these newly developed skills, he passed the code exam. He immediately got on the 40-meter Novice band and started working stations. Being in Alaska, he was very popular! After a while, the old DX bug began to nibble at him. Working stateside on 15 and 40 was *neat* (10 was not open at that time), but he wanted to talk to everyone, everywhere! Because of all of his activity on the Novice bands, his code speed improved tremendously and he felt confident about passing the General Class 13 wpm test.

The General theory looked hard, but after he began to understand what the concepts meant in practical terms, the math became a snap. Chris passed the theory test on the first try and copied 100% of the code. He was surprised to learn that 13 wpm was actually quite a bit slower than he had been operating! (Amazing what regular CW operation and a good dose of enthusiasm can do for the code speed). Armed with a General Class license, 20 meters was finally available! Welcome to the 24-hour DX zone! One night, 20 was open into Europe, with several loud signals on the band. One short CQ generated one of the biggest pileups Chris had ever heard (even to this day). It was a struggle, but it was a LOT of fun! Chris credits that pileup with hooking him on DXing and competitive operating.



Chris, WL7KY, The best of both worlds. Chris doing his two favorite things.

Chris and Frank share the same station, so Chris would observe all of the "needed ones" that Frank picked up regularly and easily in the bottom 25 kHz (the Extra Class CW sub-bands)! After about a year of being frustrated hearing Frank work them, Chris decided to go after the Extra Class license. Being computer literate and active on the Internet, he found several sites where practice tests could be taken over and over again, with questions from all of the question pools. His study method was to read the license manuals for about two hours a day and drill with the on-line tests.

As many have found in the past, Chris found the Advanced Class test was the hardest, but again, once the math could be related to real life applications, it became a breeze. Taking advantage of testing at a hamfest, Chris walked away with his Extra Class license at just 14 years old!

After upgrading to Extra Class, the contesting bug really bit. He had dabbled in a few contests already, but nothing serious. He was invited to KL7Y's place for CQWW CW, and had tons of fun participating in his first M/M operation! He is active in most contests, sometimes by himself, sometimes M/S with father Frank. His favorites are CQWW, WPX, SS, and IARU. He has also participated in the California QSO Party, NAQP and most recently, has begun to join the ranks of the hard core in the Sprints.

Chris uses computer logging, but prefers to use the paddle to send manually. He has developed skills that allow him to handle extended, high rate runs. From KL7Y, he had a run on 10 meters where the rate never went below 160/hr, for about four hours, the best hour being 186! He is equally adept at phone operation, effortlessly handling 200-300 per hour, having a blast handing out that much needed Alaska QSO.*—Prepared by Mike Conatore, K7NT* ■

The Tennessee Contest Group

Scott Robbins, W4PA
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One of the newer clubs in Amateur Radio contesting, the Tennessee Contest Group (*TCG*) has grown from humble beginnings in 1993 to a loose confederation of contesters spread throughout Tennessee, Kentucky, Alabama, and Mississippi.

The initial impetus for the TCG was provided by Ric Painter, W04O (then WA6KUI) of Nashville, TN. After participating in the *NCJ* Sprints and the North American QSO Parties in the winter of 1992-93, Ric felt that his participation in these contests would be enhanced if he were able to join in the team competition each contest offers.

For the August 1993 NAQP CW Contest, Ric and Jim Emery, K4AMC, contacted several other contesters in the Nashville area in an attempt to form a team for the upcoming event. Ric and Jim agreed to call the team "Tennessee Contest Group" and were joined by N4ZZ and AA4DO for the team competition. Result? KZ2S noted in the NAQP CW score summary in the March-April 1994 issue of *NCJ:* "A brand new team took the top spot in team competition. Congratulations to WA6KUI and his Tennessee Contest Group on a fine first-time effort."

Fueled by the initial success in the NAQP, Ric took the initiative to research published contest results in several magazines and list Tennessee contest operators who had submitted logs for multiple contests in recent years. Invitations were mailed to participate in club competition with the Tennessee Contest Group if the operator was not already committed to another contest club or team.

Right from the start, Ric and the TCG embraced a philosophy that has shaped the culture of the club in its present form. There were no restrictions placed on TCG membership. Anyone could join regardless of license class, activity level, or geography. The only requirement was that the individual members have FUN at whatever contest participation level they chose. Write "Tennessee Contest Group" for club competition on your summary sheet and you were a "member."

By 1995, the participating membership of Tennessee Contest Group had grown and some discussion ensued about the direction of the club. The difficulty lay in forming an organization where the bureaucracy of running a contest club did not overwhelm the initial mission: to have fun contesting at whatever level of participation. Some new TCGers had belonged to contest clubs in other areas of the United States and wanted to take the best parts of those organizations and leave the bad parts out.

Jack, W4KH, Tom, K1KY, and Lee, NY4T, at the 1998 Gallatin Hamfest.

The first obstacle to be overcome was a lack of ARRL affiliation for participation as a contest club in ARRL sponsored events. To facilitate this, a formal proposal was presented to the (ARRL affiliated) Nashville Amateur Radio Club, Inc (*NARCI*) to sanction and support the Tennessee Contest Group as an Affiliated Special Interest Group of NARCI. This proposal was accepted by NARCI in January 1995, and TCG began to engage in ARRL sponsored competitions as TCG and/or NARCI.

A difference of opinion over the mission of Tennessee Contest Group versus the overall goals of the local Nashville club led to the voluntary disassociation of TCG from NARCI in late 1995. The only negative point to come of this decision was that TCG was unable to participate as a club in the club competition of ARRL sponsored contests in 1996.

From the start, the philosophy of the Tennessee Contest Group was, and is, to have fun competing and interacting with other contesters in our local geographic area. There was much discussion over club membership, officers, dues, newsletters, participation requirements; one could literally be buried in all the details and forget that the club should be secondary to your own interest in contesting. We all vowed to not make participation for the "sake of the club" and "racking up club score" be more important than enjoying your own level of participation.

Late in 1996, it was decided that the club should be formalized and the bureaucracy kept to a bare minimum. We declared ourselves "official" at the January 1997 TCG meeting and officers were elected. Charter members were: W04O, K4RO, AE4ZZ, N4ZZ, K0EJ, W4PA, K1KY, K4AMC, K4JNY, KC4QFR, N4CM, N4UTM, W4NI, W9WI, and NN4T. Only two officer positions were created: Facilitator and Executive Assistant. W04O and K4RO were elected the first officers. K0EJ drew up an intentionally vague mission statement, keeping with the spirit of the organization.

The club itself is centered at Murfreesboro, TN, about 40 miles southeast of Nashville. Tennessee provides a slight geographic challenge for meeting the ARRL 175-mile medium club competition rules. The state is 450 miles long from end-to-end. TCG made an effort to include as much of the state as possible when the club was initially chartered. We encompass all major metro areas of the state except Memphis in the far west and the Johnson City/Kingsport/Bristol metro area in the far northeast corner. The club territory encompasses parts of Kentucky, Indiana, Mississippi, Alabama, Georgia and North Carolina. The Atlanta metro area is even within our 175-mile limit.

Current TCG officers are K1KY as Facilitator and K0EJ as Executive Assistant. We are a very active club and keep in touch with each other on a regular basis by e-mail, telephone, and on the air. Our formal monthly meetings are held the first Saturday of each month in Hendersonville, TN (just north of Nashville). In the 12 months preceding the writing of this article, TCG also held meetings in Murfreesboro, Nashville, Jackson, Chattanooga, Knoxville, Gatlinburg and at the Dayton Hamvention. We have also recently added an "eastern division" of the TCG in an attempt to facilitate more gatherings in the eastern part of the state.

Our membership criterion is very minimal: Any licensed Amateur Radio operator, with an interest in contesting, can be a TCG member. The only requirements are attendance at two meetings per year and submission of two contest scores per year with Tennessee Contest Group credited for club competition.

Thanks to the efforts of Kirk, K4RO, TCG has an Internet Reflector for our use to pass along scores, advice, info about meetings, and general discussion. Often items that appear on the Internet Contest Reflector will be forwarded and discussed by our members on the TCG Reflector. Ours is an open Reflector; we have several non-members who read it regularly and anyone is welcome to participate. Kirk has also created a web site for us, located at **http://www.k4ro.net/tcg.html**.

TCG also holds regular on-air meetings. We meet at 0230 UTC Friday (Thursday night local) simultaneously on 28.345 MHz and 1.880 MHz SSB. Generally the activity will start on 28.345 MHz in the Nashville metro area

and then shift down to 1.880 MHz a few minutes later for regional coverage. Nashville metro members are also found on 144 or 220 MHz immediately post-contest for local discussion through K1KY's repeater farm in Gallatin.

For team competitions in the NAQP and Sprint Contests, we base our team membership on merit. Example: To pick the NAQP CW team 1 for January 1999, each club member's scores were taken for the two previous NAQP CW Contests in January and September 1998. The top five average scores for the two previous contests were put on team number 1. We do not limit the team participation. We usually field 3 or more five-member teams for the NAQP Contests, and for the August 1998 NAQP CW had five five-man teams enter the competition. We are always happy to have non-TCG members on our teams for NAQP or Sprint and have had participants from all over the USA on TCG teams in the past three years. We will field as many teams as we can find available interested contesters. For the Sprint, we often fall a couple of people short of a full 10-member team and add people outside TCG to round it out. Remember, for NAQP and Sprint teams there are no club membership requirements, only pre-registration of teams with the contest administrator.

In 1997 and 1998, our operators have enjoyed a number of Top Ten finishes in various categories of the CQ WW DX, ARRL DX, IARU HF, Sweepstakes, and NAQP CW/SSB Contests. In May 1998, TCGer W9WI won the legendary Dayton KCDX Pileup Contest...for the third time! Many of our top operators are now running fully functional two-radio single op stations at their home QTHs, with the encouragement of the club to keep up with whatever the state of the art in operating styles are.

Tennessee Contest Group, under the guidance of W9WI, has also revived, and is sponsor of, the Tennessee QSO Party. This year's Tennessee QSO Party was held on September 20, 1998. TCG club station K4TCG was operated from the multi-multi QTH of K1KY in Gallatin as a special 100-point bonus contact.

K1KY's multi-multi contest station in Gallatin has served as a training ground for new contest operators. Rather than stress all-out competition, Tom often operates SSB contests multi-single or multi-multi with an emphasis on training new operators and having fun. This has paid off with the addition of several new K1KY-trained operators now available and enthusiastically participating in the club.

Lately, we've made an effort to encourage participation in VHF and RTTY contests as well as the traditional HF CW/SSB domain. Some of our diehard HFers (myself included) have ventured above 28 MHz for the first time. AC4LS took me VHF rovering during the January ARRL VHF Contest and was that ever a unique experience! I would have never tried that on my own.

For the future: It is safe to say that interest in contesting among the members of the TCG has been kept at a higher level than would have been the case without the club. We participate in each other's antenna projects, strategy discussions, moral support; anything you'd find in a contest community anywhere. Many of us have become friends outside of contesting and participate in social events unrelated to contesting or even Amateur Radio. That is the hidden benefit of a contest club; if you share a common interest in one place, there are sure to be common interests in other places as well.

Thinking of starting a contest group in your local area? I hope you'll find the experiences of the TCG to be of benefit. Any of us will be happy to share our experiences with the do's and don't of forming an easygoing, successful club.

We'll see you on the air, and next time you're beaten to Africa on the high bands or the Caribbean on the low bands for a multiplier, remember even Tennessee has its geographic advantage, no matter how small! ■

H. Ward Silver, N0AX
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"The Rovin' Estonian—Hillar Raamat, N6HR"


N6HR

How many guys do *you* know that have a real, honest-to-goodness Viking helmet? And a trombone? And use them together? That should pretty well narrow it down—to Hillar, N6HR. He's been a fixture on the contest scene for years and years and a welcome addition to the Pacific Northwest ham radio community. Most recently, he's been running up the big numbers from the sunny islands of KH6... quite a change from his beginnings on the shores of the Baltic Sea.

"I first saw the ham radio light of day—at an early age, I might add—in Tartu, Estonia (then UR but now known as ES). A dozen-plus years later I had the great fortune of finding myself still alive and situated in a bombed-out 'displaced persons' camp in Memingen, Germany—the ex-home of the infamous Messerschmidt ME-262 jet fighters. Amongst the airplane ruins there were all kinds of radios. As a 13-year-old, I managed to build my first radio from German military P-2000 tubes! Yeah!"

This is not the usual "my high-school buddy" story that you've become accustomed to my re-telling in this column. Hillar would not experience Field Day for a few years.

"A bit of transmitting followed—after the war there were no real licensing authorities in place, so I found an old callsign—DL4JB—and used that. A local gentleman—Heinrich Hintzer—encouraged us and thus became my first Elmer."

"Several years later—in 1950—I was on the streets of Detroit, Michigan looking into store windows where 'Uncle Miltie' in glorious black-and-white was prominently beaming forth out of the Motorola 7-inch TV sets. Glory Be! *Mon Dium exaltum!* But—alas—in these days one had be a citizen of the US before a license could be issued. No citizenship—no license. Oops!"

One thing about emigrating from the bleak surroundings of post-war Germany, America certainly was the land of opportunity for a fellow that could make ham transmitters from aircraft radios. "The good news was that I had a chance to go to school at Wayne State University. Wayne U was only famous for one thing—they held the world's record for stuffing a player piano through a 6-inch hole! By now I am sure Purdue must have passed this phenomenal feat!"

Aside from the topological intricacies of passing percussive instruments through a torus, Hillar rectified the paperwork situation. "Nirvana came in 1955. I became a citizen and one week later passed my 1st Class Commercial License exam! Instant meal ticket! I became K2AYC, with Bud Hall, W2LSX as my 2nd Elmer."

"My first contest as K2AYC was in the 1957 Sweepstakes. As best I can recall, I had a hard time figgerin' out who KH6IJ was and W6AM still owes me—posthumously—a replacement front end to my HQ-110 receiver! I did have some 500+ QSOs and also earned DXCC as K2AYC."

"Another good thing—I worked my way through school as a studio engineer for WDET and WJLB—good money. For WJLB I got to take all the Baptist church 'remotes'. Yeah! [Having done broadcast remotes myself, this definitely counts as Field Day.—*N0AX*] And then as a transmitter graveyard shift guy—I got lots of overtime! I was rollin' in dough! The good life!!! ...and then I graduated..."

This event can attract attention. "Two weeks later, the President of United States invited me to join our esteemed armed forces and since all kinds of people were shooting live ammo all over the place again, I became a Viet Vet courtesy of the USN! After this obligatory duty, I got a job offer from Lockheed and—heck—I don't like BIG outfits but they pay good money. So I ended up in Sunnyvale at Moffett Field NAS—the home of the Fleet Ballistic Missile program—Polaris, Poseidon, Trident—working for the Navy again. Thirty years later I can attest that this is as great a career as any man on this Earth can have!"

All this rolling around the West Coast gained Hillar a new call and club. "I became WA6HRS and then N6HR when the N-block was first released. As WA6HRS—the second-most-lowest form of ham radio life [Sixes don't get no respect—*N0AX*]—I managed to get into some more contests and became a member of the Northern California DX Club. I've been a member for more than 35 years."

"My work carried me to over half the globe—the Navy does not test rockets in populated areas! I became KX6MV ('64) and ZD8HR ('78) plus numerous other calls, including an Estonian callsign. I have been ES1HR for years."

Hillar moved to Whidbey Island a while back and has been active in the Western Washington DX Club ever since. You'll hear him on for contests and in the DX pileups. Except for a legitimate P5, Hillar has all the DX skins on the wall. "My home station—it's OK for local contests, but N7LOX beats me regularly. In this way-down central-Whidbey canyon it's just good for keeping the DXCC current. It is not a contest station—though I manage to default into a few now and then."

"On the contest front—I have held, however briefly—three Oceania CQ All-Time records—WPX AB SSB (KX6BU), 21 MHz CQ WPX CW (N6HR/KH6) and CQ WW CW 14 MHz (KH6MD). Higher scores have come along since. But of more recent vintage—KH6RS WPX 95 3rd World, KH6RS SSB 1996 4th World, KH6RS ARRL CW 1997 1st World SAO and in 1998 ARRL CW SO NH7A SO—5th world. This year as KH6RS—who knows?"

Hillar has developed a taste for travel—preferring the excitement from "over there" rather than slugging out "over here." This has been going on for quite a while. " I was representing Finland as 'Ocean-Golf Zero-Charlie' from Brando Island (OH0W) in 1962 in the IARU contest. It has a pair of 40-meter towers, stacked arrays including a tribander beamed to Yugoslavia to keep the YUs and LZs from stealing the frequency while beaming JA-land. There's a nice small house and a big shack and a wood-fired sauna! But the outside outhouse is 500 feet away, no running water, no beds, no linens, no dishes, no NUTTIN' !! Elsie has a funny story to tell about local linen—and I have a similar story about Finnish Lappinkulta beer! The 230 V 50-Hz AC never blinked when running the Big Alpha! But I did run into a 6-hour aurora which killed a winning score."

Some of the expeditions have been under fairly primitive conditions. Not all of those big signals come from a comfortable villa with maid service and tall cool ones on the veranda between shifts. "Once on an expedition with Elsie I asked Martti, 'How come no amenities?' His reply was, 'Are you here to contest or curl up with your tootsie-roll?' Fair enough!"

Being retired, Hillar and spouse Elsie (N7WDX) like going hither and yon. "Elsie and I get invited to here and there to participate in ham radio. Martti, OH2BH, has been a good friend and we have been part of his group—OG3C

(Continued on page 38)

VHF-UHF Contesting!

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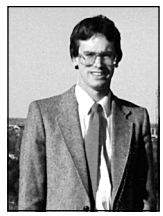
Meteor Scatter in the January VHF Sweepstakes



N0JK

I operated from WB0DRL (EM18) on Saturday evening during the contest. We concentrated our efforts on 6-meter meteor scatter. Running about 900 W out to a 6-element Yagi up 60 feet, we made around a dozen 6-meter meteor scatter QSOs in four hours. Consistent scatter signals were noted from K2TVI, N2XTX, WA8WZG, WC2K and W0UC/9. We caught a nice burn at 0613Z and worked four stations in 2 minutes. The signals briefly sounded like E-skip! There were some other stations that were heard fairly often but were unworkable. They didn't seem familiar with meteor scatter operating techniques. Some would call long CQs through an entire burst. Others were heard rag-chewing with another station through a burst—or if called would give our call several times, their call several times, their grid square, city, state and name—then *poof*—the burst was gone! Sharp operating made the most difference in whether or not most of the QSOs were completed. We didn't operate Sunday and missed the 6-meter Es opening.

One Ham's Contest is Another Ham's Candy

Rick Rosen, K1DS—December 1998 *Cheesebits*

I was actually surprised when Ron, W3RJW, told me he hated operating contests. I love them, or at least think I do, since I anticipate each one with delight and pine when some business or family event interrupts the pleasure of a full effort. That was the case this year—with a business trip knocking out Sunday in the January VHF SS. Sound familiar? Since I started in ham radio as a Novice in 1959, I have been hooked on the competition of the Novice Roundup, Sweepstakes, the venerable and retired VE-W QSO Party, the DX Competitions and, in the past 25 years, the VHF SS and QSO Parties. What is the challenge? Well, for each of us there must be a motive. Since winning a radio contest does not get you more food or money, there is a self-appointed task that generally drives each of us to research the dates, get the proper gear going, and then actually sit down and make those two-way contacts to roll up the points.

If you've got a great site, a substantial station, and the ability to get on the air regularly, I can understand that contesting may seem like drudgery. After all, spending many hours in front of the rig in an apparent race to get in all those contacts, knowing that there will always be someone out there with a bigger and better station, at a higher and more densely populated location, there is a limited reward that can be achieved. Several years ago, at Dayton, I attended a seminar at which a ham described his move from CA to CO, after having made mega-bucks in the software industry. He bought a substantial piece of land, got contractors to set up lots of towers and arrays, set up top-of-the-line contesting stations for HF, and got first class guest ops. But he never was able to achieve his objective of beating the East Coast Big Guns, "who have a DX pipeline to Europe." Despite all the time and effort, he never seemed to be able to achieve the more modest goals that each of us have probably set for ourselves.

Now in my second year as a Packrat, having experienced one full year's cycle of club and operating events, and having been a VHF op for 20+ years, I can say that there are personal goals that drive me to participate in each contest—as best as I can—despite my limitations of having an antenna restrictive covenant in a dense housing community. This past January, I was part of the group effort at K3EOD for the first 12 hours, then after a few hours sleep, went out as a rover.

Alas—the rover category! How can you keep a guy busy hamming who doesn't have a great VHF location, high power, big antennas or operator density? By putting him and his gear in a vehicle, and having him move from spot to spot to operate, providing extra QSOs for his confreres, while adding the challenge of finding new vistas, keeping warm and fed, batteries charged and the gear operating. For those of us, like me, who are unable to have active radio setups at home, exploring new grids and rover sites is one of the challenges of VHF contesting.

Concentric Grid Distance Scoring in VHF Contests

Gene, W3ZZ, in a recent *CQ Contest*

"Larry, N0LL; Lew K4VX and myself taken at the ARRL Kansas state convention last October."

article proposed using a concentric grid distance scoring system in VHF contests. This is a way to reward making contacts at longer distances in VHF contests. As I have noted for 6-meter F2 DX contacts in VHF contests (and the same would apply to EME QSOs) a contact a mile away or 10,000 miles away has the same point value and is only an extra grid multiplier.

Ed, K3DNE, noted, "A few years ago I worked SM5FRH in JO88 on 2 meters via EME on my moonrise in the January VHF Sweepstakes. I spent a good hour trying to work him (I know, not the most valuable hour spent in a contest but I did enjoy typing JO88 in my log) and completed and got 1 point. By the end of the hour I felt it should have been worth more! Using concentric grid distance scoring that QSO would be worth 3 points."

This idea may have merit. However, it would make comparisons with prior contest record scores extremely difficult. It also doesn't reward the effort for making extreme DX contacts. As I understand the concentric scoring formula, any contact that is more than 3 grids away would count as 3 points (not 4 points if 4 grids away, or 10 points if 10 grids away etc). This scoring system might favor stations located in high population areas or adjacent to them on mountaintops. A station located on a high point 3 or so grids away from the East Coast corridor—say in FM08—would clean up filling their log with 3 point QSOs on the UHF and microwave bands. If the scoring system retained the extra points for UHF and microwave contacts then a suitably located station near high population centers could "run

June VHF QSO Party Highest Scores, Single Operator by Call Area—1985-98

The following lists the highest Single Op Scores from the June contest for each call area, updated to include 1998 results. Section and Division records are indicated. As with the other tables I have posted, these show just the top few scores from each area.

Call	Yr	Sec	Score	QSOs	Grids	Bands	Div. Rec
WA2TEO	96	CT+	417,186	1060	294	*9EF	NE
WA2TEO	93	CT	412,002	1086	282	*9EF	
K1TEO	98	CT	385,560	993	270	*9EFG	
W1VD	86	CT	367,443	1067	279	*E	
WA2TE	97	CT	350,058	987	246	*9EFG	
WA2TEO	92	CT	336,936	917	278	*9E	
WA2TEO	95	CT	304,848	952	232	*9EF	
WA2TEO	91	CT	270,712	821	247	*9E	
KA1ZE	91	CT	268,956	794	241	*9EF	
N2CEI	93	NNJ+	301,194	808	261	*9EFGHJ	HUD
N2CEI	92	NNJ	269,619	734	259	*9EFGHIJ	
K2SMN	87	SNJ+	250,848	666	268	*9EF	
N2BJ	87	ENY+	231,990	804	222	*E	
W1XX/2	92	ENY	230,748	789	246	*9E	
N2WK	96	WNY+	229,362	599	254	*9EFGHIP	
K2SMN	88	SNJ	226,335	667	237	*9EF	
N2CEI	97	NNJ	225,862	700	221	*9EFGHIJ	
WA2OMY	87	EPA+	305,665	831	290	*9E	ATL
K1RZ	98	MDC+	289,044	848	252	*9EF	
K1RZ	93	MDC	286,960	796	272	*9E	
KB3QM	87	MDC	272,538	781	294	*E	
K1RZ	92	MDC	248,688	730	264	*9E	
WA2FGK	88	EPA	249,320	692	271	*9EF	
K1RZ	97	MDC	243,698	808	206	*9EF	
WA2FGK	90	EPA	240,384	630	256	*9EF	
AA4ZZ	96	NC+	193,200	645	276	*	
WA4CQG	96	AL+	192,080	780	245	ABD	SE
N8UM	92	TN+	166,615	635	235	*	
WB4SLM	87	GA+	156,104	632	247	AB	
WA4NJP	87	GA	153,517	578	241	*E	
KA2DRH	92	AL	153,339	627	237	ABD	
WD4MGB	87	SFL+	151,726	695	214	ABD	
W3IY/4	86	VA+	145,754	543	203	*E	
W5ZN	98	AR+	626,220	999	420	*9EFGHIJ	DLT
WB5IGF	96	AR	563,528	999	406	*9EFGHI	
N5HHS	98	STX+	406,308	1348	294	ABD	WG
K5UR	92	AR	398,832	980	336	*E	
W8CM	98	NTX+	396,210	1254	281	*9E	
W5UWB	98	STX	372,070	1225	290	*E	
K5UR	87	AR	367,734	878	367	*E	
N5WS	98	STX	365,078	1114	293	*9E	
K6KLY	96	SCV+	136,136	603	182	*9E	PAC
N6NB	93	SJV+	112,041	520	177	*9E	
W3SE	98	LAX+	110,544	574	147	*E	
WD6AUP	87	ORG+	101,896	466	188	*E	
W6CPL	87	LAX	99,120	423	177	*EI	
N6HKF	98	ORG	97,197	445	179	*	
W6CPL	88	LAX	89,112	423	141	*9EF	
AA7A	96	AZ+	140,360	588	232	ABD	SW
KE7CX	92	OR+	118,035	498	215	*9E	NW
K7ICW	96	NV+	108,570	427	231	*E	
W7YOZ	92	WWA+	107,920	457	190	*EFGIJ	
W7FI	92	WWA	93,150	450	207	AB	
WA7KYM	93	WY+	84,770	446	173	*	
K7IDX	92	WWA	82,533	451	183	A	
WA8WZG	98	OH+	592,668	1160	326	*9EFGHI	GL
WA8WZG	96	OH	429,040	844	310	*9EFGHI	
WA8WZG	97	OH	395,031	838	273	*9EFGHI	
KE8FD	98	OH	258,718	655	277	*9E	
WA8WZG	94	OH	241,362	631	207	*9EFG	
WA8NJR	92	OH	239,680	689	280	*9E	
WA8NJR	93	OH	221,960	691	248	*9E	
KE8FD	96	OH	219,700	614	260	*9E	
WZ8D	93	OH	207,612	631	292	*	
WD8ISK	95	WV+	206,780	568	245	*9EF	ROA
N2BJ	98	IL+	280,575	863	261	*9E	CEN
WD9IIX	87	IL	219,114	740	259	*E	
WB9MSV	87	IL	200,043	582	279	*	
K9KL	98	WI+	125,132	476	218	*9E	
NE9O	87	IN+	123,060	555	210	ABD	
K2DRH	98	IL	114,460	590	194	AB	
WB9MSV	92	IL	108,262	420	209	*9E	
K0GU	98	CO+	287,749	1089	259	ABD	RM
N0LL	92	KS+	272,790	824	315	*E	MID
N0LL	96	KS	240,536	798	281	*E	
K0TLM	87	MO+	217,344	653	283	*E	
N0LL	91	KS	213,597	629	293	*E	
N0LL	98	KS	202,386	723	267	*E	
WA0BWE	92	MN+	200,187	646	261	*9EFI	DAK
VE3BQN	92	ONT+	145,418	608	221	*E	CAN
VE3ASO	88	ONT	132,870	499	215	*9EFI	
VE3ASO	87	ONT	127,908	464	228	*9EFI	
VE3ASO	89	ONT	124,070	462	190	*9EFI	
VE3ASO	90	ONT	107,864	411	194	*9EFI	
VE3RM	92	ONT	103,115	486	205	*	
VE5UF	97	SK+	65,274	506	129	A	
VE5UF	91	SK	50,299	281	179	A	
VE7SKA	92	BC+	45,904	300	152	ABD	
VE9AA	96	MAR+	45,353	339	133	ABD	
VE6KZ	89	ALB+	30,528	154	106	*	
VE5UF	88	SK	28,520	230	124	A	
VE6TA	92	ALB	24,282	204	114	*	
VE2XX	92	QUE+	23,608	185	104	*9E	
XE3EB	92	MEX	68,440	472	145	A	
KA3B/VP5	92	TnC	46,610	395	118	A	
XE2/N6XQ	98	MEX	23,074	260	83	ABC	
KB4CRT/C6A		88	Baham	20,832	217	96	A
HH2PK	92	HAITI	15,106	182	83	A	
YC2OK	97	INDN	14,040	187	52	ABDE	
YC2OK	98	INDN	13,794	174	66	ABD	
VP5KE	98	TnC	11,781	187	63	A	

QRP PORTABLE CATEGORY, 1987-98

Call	Year	Section	Score	QSOs	Grids	Bands
K1JX	88	CT+	137,509	556	199	*
KH6CP/1	96	VT+	129,213	489	147	*9EFGHIJ
K1JX	87	CT	120,268	516	214	*
W1VT	97	VT	107,136	480	128	*9EFGHI
KH6CP/1	95	VT	72,565	352	115	*9EFGHIJ
NM1K	95	CT	65,504	454	92	*9EF
KH6CP/1	94	VT	57,232	335	98	*9EFGHI
KH6CP/1	93	VT	51,150	302	110	*9EFGHIL
W2XL	96	ENY+	92,178	420	162	*9E
WB2ELB	92	WNY+	1,777	345	163	ABE
W2XL	92	ENY	52,632	299	136	*9EF
W2TTT	98	NNJ+	47,432	375	88	*9EP
W2XL	97	ENY	33,201	265	93	*9E
WB2VVV	93	NNJ	28,012	205	94	*9E
WB2DNE/3	96	WPA+	98,438	389	166	*9E
W8LT/3	98	MDC+	69,112	322	163	*9E
K3ONW	88	MDC	61,984	337	149	*
W8LT/3	97	MDC	58,788	279	142	*9E
WB2DNE/3	90	EPA+	29,492	255	101	ABDE
N8TLZ/4	95	VA+	43,400	248	124	*9E
N8TLZ/4	96	VA	40,098	233	123	*9E
WR3I	93	NC+	39,788	301	98	*E
KM4MP	91	VA	29,370	326	89	*E
WR3I	94	NC	27,571	251	79	*9E
WR3I	92	VA	23,288	204	82	*E
N4KWX	93	VA	20,215	273	65	*
WA4ALJ	94	AL+	19,872	222	69	*E
NO0Y/5	88	AR+	67,125	311	179	*E
KB5ZFO	96	STX+	41,148	324	127	AB
KB5ZFO	95	STX	10,730	145	74	AB
K4RWP/5	88	AR	7,920	108	72	ABD
WA6FIT	96	ORG+	23,240	250	70	*E
WA5DJJ	94	LAX+	22,388	291	58	*E
KK6KE	97	SJV+	22,134	235	62	*E
N6UII	90	LAX	21,801	341	39	BCDE
N6JO	98	LAX	21,375	204	75	*E
W7JXU	88	OR+	23,940	214	95	ABDE
N3EG	96	WWA+	22,784	205	89	*9E
K7IDX	88	MT+	21,112	203	104	A
N3EG	95	WWA	18,172	209	77	*
N3EG	92	WWA	15,200	170	80	*
W8FK/7	87	WY+	10,419	151	69	A
N8XA	98	OH+	15,604	157	83	*9EI
N8AXA	92	OH	12,495	144	85	ABD
N8AX	97	OH	11,390	130	67	*9E
N8AXA	93	OH	9,760	121	80	ABC
N8AXA	96	OH	8,970	116	69	*E
W9GKA	98	IL+	22,515	226	95	*
N9CIQ	95	WI+	13,870	158	73	ABD
KB9PCW	98	WI	9,514	132	67	ABD
N9TZL	97	IL	7,656	123	58	ABD
N9CIQ	91	WI	7,452	108	54	BD
W9SZ	95	IL	1,856	48	29	BD
W9UD	95	IL	817	28	19	BCD
N0HJZ	92	MN+	51,405	311	149	*FI
NO0Y	96	KS+	45,600	303	150	ABD
NN9K/0	95	IA+	40,228	282	113	*
WB0ZKG	88	IA	27,819	267	99	ABD
WA2HFI	91	MN	19,992	204	98	AB
VE2TH	91	QUE+	9,315	115	81	A
VE2PIJ	96	QUE	5,712	118	42	ABD
VE2PIJ	98	QUE	3,744	83	36	*
VE3RKK	91	ON+	2,871	79	33	BD
VE3BFM	90	ON	2,370	62	30	*

* = ABCD Bands
\+ = Section Record

away" with the contest. This station would not have to make the most QSOs or work the most grids—just make the most contacts "3 grids away." A "concentric scoring" system might give a station located in FM08 an advantage over one located in FN31 in the September or January contests. Concentric scoring may shift the top scores to stations located just on the periphery of the East Coast corridor as opposed to those inside it—with those of us outside the corridor still struggling.

There is another way of rewarding DX contacts. It is to use a scoring system that gives points based on the actual distance for each QSO. This type of scoring system is used for the "Stew Perry" 160-Meter contest. The longer the contact, the more points it is worth. Suitable logging software handles the calculations. Here is how the scoring for QSO points works in the "Stew Perry" Contest:

QSO Points: The number of QSO points for each contact depends on the distance between the two stations. This is computed by taking the distance between the centers of the two grid squares. Count a minimum of one point per QSO and an additional point for every 500 kilometers distance. For example, a QSO with a station 1750 kilometers away will count for 4 QSO points. No additional distance for long path is allowed.

For a VHF contest, instead of using the center of the grid square, use the full grid locator such as EM17jq. The multiplier could be the grids worked. I kind of like this scoring system—with it a Southeast, Midwest, Northwest or Southwest station that makes long haul 6-meter Es contacts and 2-meter EME QSOs will be rewarded for their efforts. "Stew Perry" scoring encourages DX contacts in place of local QSOs, and rewards taking the time and effort to pull out weak far away signals.

Should a distance-based scoring system replace the existing way scores are calculated in a big contest such as the ARRL June VHF QSO Party? This topic ignited an emotional debate on the VHF Reflector. Changing the scoring system may make it difficult or impossible to compare scores and regional/national records from past contests. It also requires entrants to use computer logging and have the software to calculate the QSO points—or the contest administrator will have to figure it for them. It might make more sense to try a distance-based scoring system in a new contest like the 6-Meter Internet Contest. ■

The Microstation—V63X

(Continued from page 19)

The most difficult time was working the US on 40 and 80. We were there to give out the multiplier; we could have made more points on the higher bands. Although we were plenty loud, certain US stations insisted on calling no matter who we came back to. On 40 I tried call areas for a couple minutes hoping to work down the pile a little but one loud station kept calling out of turn, making it impossible for the rest of the US to hear me. Eventually I said "QRM I QSY". Then I went way up in the band and by the time everyone found me I had worked enough of the big stations that the pile was manageable. The station that called out of turn never did work me on 40...

We were disappointed when the contest was over—we would have happily gone another 48 hours. It was just plain fun! Our raw score was about 5,100 QSOs, 160 zones, and 375 countries. One good thing about operating from Oceania is that almost all QSOs are worth three points; our QSO point multiplier was 2.96!

The day after the contest was the lunar high tide. Apparently we set the verticals too close to the ocean, as the radials were tangled into a big knot and one vertical started to fall into the ocean. It didn't matter—the contest was over.

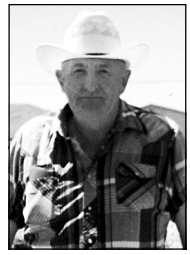
So why do we go to the middle of the Pacific when we could more easily go to the Caribbean? The contest lasts two days. Our trip lasted three weeks. The QSL card has a photo of a Manta Ray that Charlotte photographed on Pohnpei. It could just as easily have been a photo of a Japanese shipwreck in Truk Lagoon or a nudibranch or the ancient ruins of Nan Madol. Outside of the contest we operated on the WARC bands and even spent some time on SSB, racking up almost 10,000 QSOs.

Must be sunspot fever! ■

Contesting for Fun

Ron Stark, KU7Y
ku7y@dri.edu

ARRL Log Checking Comment


KU7Y

One of the big topics of the day on the Internet reflectors concerns the ARRL doing some great log checking on the 1998 ARRL Sweepstakes logs. Most people are in favor of it; even those who experienced score reductions because of the increased level of scrutiny.

While having lunch today with my friend and boss, Dick, N7CTJ, I had a thought. Just for kicks, let's say you made 1000 QSOs in the 1998 running of the SS and that you had a Q-count reduction of 10%. Loosing 100 contacts is enough to make a person feel bad! But is that 10% "error" rate really what it seems? Looking at a single logging line from the contest I see a total of 12 letters and 7 numbers in the exchange. Using an average of 3 elements per letter and 5 elements per number that gives us 71 CW elements (dits and dahs) per exchange. That makes 71,000 elements that you had to copy correctly in the 1000 QSOs you made. Let's say you missed a single element in each of the 100 QSOs that you lost. That adds up to 100 errors out of 71,000 chances! If my calculator is right, that gives you an error rate of 0.14%! I think you need to pat yourself on the back.

While all that might not be of any real value, I do find it fascinating that anyone can achieve accuracy rates like that!

QRP in CW Sweepstakes

by Wes Spence, AC5K

Many QRP stations did very well in the 1998 ARRL Sweepstakes. A QRPer who frequently appears in the SS CW QRP Top Ten authors the following article. Wes has some very good tips for all of us that are struggling to improve our scores.

Ron asked to write an article listing a few of my "secrets" since I was fairly successful and made over 100,000 points in last year's CW SS. I have been licensed over 27 years and work CW only. These comments may be most relevant to CW SS operating though they may prove to be useful to the Phone operator as well. Another piece of background information is that I do not consider myself to be a "Contester." I am in the hobby for fun and personal accomplishment. (Besides, who has the resources to win in the South Texas section these days, anyway?) If a contest stops being fun for me, I will stop and go ragchew on the WARC bands or do something else. A case in point is that I stopped after 23 hours in the last SS because I was tired and knew the few more Qs I could eke out would not be worth it for me.

My station is nothing special. I have emphasized antennas over other equipment and continually try to keep improving this component of my station. The station antennas include:

Tower #1:
Mosley TA-54M at 81 feet (4 elements on 20, 17, 15, 12, and 10 meters)
Mosley S-402 at 70 feet (2-element 40-meter Yagi)
80 meters: Half sloper at 65 feet
160 meters: Shunt-fed tower

These antennas are aimed northeast for SS. I have almost 200 feet of coax running to this tower, so my losses are higher than I recommend yours be.

Tower #2:
Mosley CL-36 at 35 feet (3-4 elements on 20, 15, and 10 meters) This antenna is aimed northwest for SS
Radio:
Ten-Tec Corsair 1 powered back to 5 W, monitored with an in-line wattmeter

I do not have a second radio to use during the contests, although that option would certainly help a QRPer just as much as a Big Gun.

I don't really have any particularly new "secrets" to success in SS. I have been in many SS contests over the years. I will usually only operate in the QRP category when the conditions are good enough to have a decent rate on at least 15 meters. Otherwise, it becomes too crowded on 20 meters for the QRP stations to really compete. I generally do not recommend beginners try QRP in SS unless they fully understand that it can be very frustrating. One must mentally prepare to "bleed" for every QSO when conditions are not good. I have never gone beyond "A" power in SS, but even the transition from "A" to "Q" can be a bit of a shock. I also suggest that you have a good code speed—at least 35 wpm—if you plan to compete for the top scoring slots. My reasoning here is that the other ops will take you more seriously if you sound like a good operator with a weak signal rather than a weak operator with a weak signal. (The latter combination tends to be ignored. The CQing station you have responded to risks losing his frequency while hassling with a weak station *and* a weak operator). But, one should also remember that operating in the SS is a well proven method of dramatically increasing one's code speed. The gang will generally slow down for you, so don't be afraid to jump in there and have a good time regardless of your present code speed.

Fatigue is a major factor in a QRP SS effort. Take all measures you can to decrease it. Use some sort of logging program to lessen that burden. I use a very old version of K8CC's NA software. I do use an interface to key the radio from the computer. The interface helps a lot—your hand gets tired from manually sending the long SS exchange. I also have three chairs that I exchange at various times to decrease the aches from sitting too long, although I feel that one very good chair may be the best choice.

As far as the actual operating goes, I use the "search and pounce" method until Sunday morning (local time). If you have a super station, you may be able to do some CQing the first day. From my location in Southeast Texas, I will start the contest on 10 meters if the band is decent. We often have a good path to W6 and W7 at that time, and I have gotten a leg up on the competition by going to a "dead" 10-meter band and logging a lot of West Coast stations the first evening. Many times the 10-meter conditions were much worse the second evening. My main strategy is to stay on the highest band open, *even if it is not 100 percent open*.

I personally avoid 20 meters until fairly late the first evening when I am usually scouting for VE8/VY1 for a multiplier. Going to 20 meters too early, as a QRPer, will leave you standing in line to work the "Big Gun" stations. Do not worry about the strong serious contesters—they will find you, so never waste time standing in line for them unless they are a rare section. With QRP, you will also quickly recognize the difference between the stations that are loud because of big amps and those that are loud because of good antennas. (The stations with good antennas will be able to work you easily.)

I operate the first 11 hours of the contest without a break of any sort. That is a winning strategy, but it will really wear you out. I sleep for 2 or 3 hours and get back to it, quickly running 160, 80

and 40 meters, picking up QSOs and multipliers. Ultimately my goal is to get on 20 meters early enough to establish a CQing frequency before the big stations get there. It is often slow at first, but this is the only way a QRPer can get a decent frequency. The rates here will be some of your best in the contest as the band really gets hot. I have defeated the QRO stations attempting to steal my frequency many times by switching between my east and west 20-meter antennas. I change bands a lot during the last half of the contest and CQ as much as possible. Trying to search and pounce on Sunday usually means sifting through all the dupes for someone you haven't worked yet. There are some loud stations that will never call CQ in a contest. If you are going to work them, you must CQ. I keep up with mults, but I don't get too worried about them. (My one and only "Clean Sweep" was in 1983!) This is one area that I haven't been able to improve on, although I usually get within one or two sections of a Sweep.

I guess my only *real* goal in the Sweepstakes is to *have fun*. More than anything, that goal has helped me keep going. I am competing only against my previous scores. On those rare occasions that I have also won my section or division, I consider that as just icing on the cake. I acknowledge the helpful hints and training from the Texas DX Society, and my radio mentor, Richard, K5NA. I do regret that my improvements over the last few years have been marginal. Perhaps I need to participate in a multiop effort to pick up some new ideas from the true contesters. I hope to see you in the next CW SS—I will be the one having fun!—Wes Spence, AC5K

Thank you very much for the good ideas Wes. I am looking forward to working you all during WPX CW. If you have any suggestions for topics you would like to see in this column just let me know.

73, Ron, KU7Y ■

Contest DX-Ventures

DXpedition Destinations

Sean Kutzko, KX9X
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KX9X

Hello, Fellow Contesters. As the winter contest season draws to a close, we can take a short break and reflect on our respective accomplishments. Yet, the next season is never that far around the bend and we need to start our planning right now. Maybe this is the year you should go on your first DXpedition.

This month's destination is for the true adventurer—Vietnam, 3W. Hiroo, JA2EZD, has been building several rental DX locations in both the Caribbean and Indochina. In Vietnam, a very popular operating position is located in the Kasati building (the home of Vietnamese Telecommunications), about one mile from the heart of Ho Chi Minh City—still called Saigon by many.

The station consists of a Kenwood TS-850 and an SB-200 amplifier, as well as a set of Bencher paddles. Antennas include a 4-element tribander on the roof of the building and dipoles for 40 and 80 meters. The station does not have a computer. For the record, the AC power in 3W is 220V/50-Hz.

Many people may think it is difficult for a foreigner, especially an American, to get a license in Vietnam. "NO!" says Hiroo, "In Vietnam today, people from any country can get a Vietnamese license. Licensing time is around one month. Our friend 3W6LI/3W6AR will help to get your license processed."

To get a 3W license, you will need to provide photocopies of your passport, your present ham radio license and your Vietnam visa. The licensing fee is $100. Your callsign will have the 3W6 prefix. In addition, you must be a member of the Vietnam Amateur Radio Club to operate from the Kasati building station. The annual membership fee is $75.

Please note that there are no accommodations at *DXshack Vietnam*. There are, however, several hotels nearby. The closest is about 600 feet from the Kasati building with rates ranging from $30 to $50 per night. Food and points of interest are very close at hand. "In Vietnam," Hiroo says, "Kim-do

The Kasati building, the home of DXshack Vietnam.

Hotel's location is like 5th Avenue in New York City. It is located in the center of Saigon City. You'll find many restaurants nearby."

If Vietnam sounds like an intriguing spot, you can send e-mail to **DXshack@aol.com** or visit their web page at **http://www.nwlink.com/~ki6fe/dxshack** for more information. Hiroo also suggested that if you have any additional questions that you contact Steven Weinstein, K2WE. Steve, along with Les, W2LK, were the first Americans to operate in Vietnam after the war when they operated from the Kasati building QTH in March 1998. You can contact Steve via e-mail at **k2we@juno.com**.

Thanks for reading! My special thanks to K2WE for his help with this month's column. I would also like to thank Hiroo; he has been in hospital lately with a liver ailment. Let's hope he is QRV again soon, and also pass along our best wishes for his upcoming wedding. Don't forget to visit my QTH Rental Page at **http://hobbes.ncsa.uiuc.edu/sean/qthlist.html** for information on other places to rent around the world.

In addition, please let me know of any other rental sites that I should add to my listing.

73 es see you from the Other Side.
Sean, KX9X ■

The Contest Traveler

Joseph L. Pontek, Sr. K8JP
v31jp@logical123.net

Hello, Contest Travelers—experienced and dreamers, alike. I start this column as I am preparing for another trip back to Belize. A new challenge presented itself while packing for this trip. I have FT-1000MP, replacing my lightning struck FT-990, and am I proud of my new baby. I had configured my other cases and the internal packing to prevent, or, at the least minimize, damage that can be inflicted by airline gorilla cargo handlers.

As I was visualizing how to design the foam inserts to protect my MP, it came to mind the Yaesu had already designed packing for me! Sure enough, in the original shipping box, I found two molded Styrofoam blocks, one for the front and one for the back of the MP. Hmm? Can I be that lucky? Well, I was close. When I fit these inserts onto the MP, I found it *almost* fit into the Pelican 1650 carrying case. After trimming off about 1/4-inch of foam on each block, the MP dropped right into the case. I needed only to add some additonal foam blocks around the middle section of the radio to provide protection from any loose items that might damage the finish. If you do not want to modify your manufacturer's packing, you can use it to model your own, something I may have to do after a number of trips.

By the way—these Pelican cases are rugged, waterproof, have a pressure release and will support 150 pounds of content in water. We know we are limited to 70 pounds per bag by the airlines, so the case should easily fit your weight requirements. Pelican cases are not cheap, but they certainly can save the day if your precious radio goes into the drink on a uninhabited island DXpedition, or even while it sits outside in a tropical downpour while you are negotiating with an irritable grass shack sheltered Customs agent.

Contest DXpedition Planner—Part One of Three

by Dennis Ashworth, K7FL
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As the sunspot count continues to grow, so do the number of contest DXpeditions. We are pleased to present a well thought out three-part series about planning for contest DXeditions—big or

small—by Dennis, K7FL. We are certain that Dennis's planner will be a valuable resource for the people charged with pulling all the pieces together for a successful effort. This planner can even be used to plan out a successful, safe and fun Field Day! Dennis's Planner will ultimately find its way onto the NCJ *website Contest DXpedition pages to join the other planning data already residing there.—'JP.*

As I began planning my teams' first Multi-Multi effort, IH9P in the 1998 CQWW SSB DX contest, I quickly discovered a void of public domain information on organizing remote contest operations. There are a few excellent books cataloging experiences of DXpeditions (eg VK0IR, 3Y0PI, XR0Y, etc) and articles in magazines relating team experiences. However, missing was generic detail of how to start the planning process—a succinct list (if that's possible) or checklist of things to consider during planning. Realizing this, I committed that if we ever survived our first Multi-Multi (and at times I had my doubts!), we would publish an outline to serve as a repository of lessons learned by the contest community which can be added to over time. Life is simply too short to repeat the mistakes of others. Instead, we need to leverage the experience of other operations and move forward.

Although this list was constructed with a Multi-Multi operation in mind, it is certainly applicable to smaller operations. It's better to have too many than not enough things on a checklist. We learned this when reviewing the medical supplies list from VK0IR. Although our operation did not have the medical risks of a remote site like Heard Island, we still found items we needed to take that we had not previously identified. So, if something is non-applicable, then throw it out. An overly thorough checklist may just direct the planner to an item previously overlooked, thereby avoiding problems on site.

Determine Your Goals

Have you defined your goals?
Are your goals realistic?
Have you defined your operating category? Multi-Multi? Multi-Single? etc.
Do you desire an intense or relaxed operation?
Do you wish to take a spouse, or significant other?
Have you defined how much money you wish to spend?

Goals from 1998 IH9P M/M in CQWW SSB DX:

We will go to Pantelleria.
We will educate ourselves about DXpeditions from books and others.
We will properly plan every step well ahead of time.
We will work together as a well-oiled team.
We will have lots of fun.
We will exceed 11,076 Q's and 25M points (a TK5NN benchmark).
We will not endanger human lives.
We will be ambassadors for Amateur Radio.
We will operate within all contest statutes.
We will be good neighbors to the residents of the island.
We will use this experience to evaluate how well we work as a team and explore opportunities for future group expeditions.

Having developed our goals early in the planning process, we were able to maintain reasonable focus during planning and operator recruiting. However, we did learn the importance of clearly defining and documenting the planned operating category in the goal statement. This seems pretty obvious in retrospect, but had completely escaped us until we had recruited ten operators. Many of our operators were very experienced in Multi-Single and most had assumed that M/S would be our category. However, there existed another group of operators who believed anything short of a full-blown Multi-Multi was a waste of the amassed talents. Obviously, this would never have been an issue if our planned category were clearly stated for new team members in the IH9P goal statement. We made it through this crisis, but it would have been avoided in its entirety if we had captured the operating category in the initial IH9P goal list.

Choose Your Location Carefully

Does the location provide good propagation into major ham population centers to optimize Q's?
Is there close geographical proximity to multiplier rich continents?
Is there already an announced operation planned from the location?
Can you obtain licensing for your operation?
Is political stability in the country or region a consideration?
Is weather a concern? How might adverse weather affect transportation of the team and supplies to/from the QTH? How might adverse weather hamper antenna assembly and disassembly?
What are the costs of travel and logistics?
What are the costs of housing and food?
Are there radio supplies available locally if needed?
Is the location rare? If so, perhaps your operation can gather more Q's during the contest from DXers seeking to work a rare one?
Is this a good place to take family members? Are there non-radio attractions? Is it safe?

Pantelleria was an excellent choice for us. Many of our operators were Italian with strong knowledge of licensing issues, costs, local customs and island conditions. The one area that could have spelled disaster was our inadequate planning for severe weather. Pantelleria can be very stormy during CQWW DX SSB and CW season, frequently canceling ferry transportation to and from Sicily. This indeed did create problems after the contest with a few of us missing airline connections and work obligations. Had ferry service been interrupted *before* the contest, delaying our arrival on Pantelleria even a day, it may have spelled disaster.

Poor weather can also severely impact antenna set-up and the reliability of utilities. The bottom line is to develop contingency plans for transportation and outdoor activities if severe weather is a moderate probability.

Choose Your Site Carefully

Is there a clear path to your prime radio targets?
Is there enough ground to put up the antennas required, including Beverages?
Is there sufficient operator and equipment protection from sun, cold, insects, etc?
Are there sufficient and reliable power sources at the site (commercial or generator)?
Is there the ability to stage materials before the contest, and/or for future operations?
Is the site "RF quiet", with few power lines or industrial sites nearby to generate RFI?
Have you assessed the TVI possibilities and implications of your operations?

A Multi-Multi takes a huge amount of real estate. We were fortunate to have access to a reasonable amount of space to properly deploy our antenna plan, although a bit more room would have provided better placement options to reduce inter-station interference. One very cold and windy afternoon during the contest, I decided to brave the weather and check an antenna that was tied down in a vacant field. Well, it wasn't exactly vacant… There was a bull there, but luckily I saw him first. I decided the antenna anchoring was probably good enough and made a hasty exit. The moral: Respect your neighbor's property, whether the locals have two or four legs!

We had rented two properties, believing that two power drops would be sufficient to meet our power needs. This would have been adequate for

intermittent operation, but clearly was a problem with 5 or 6 stations transmitting simultaneously. Luckily, we were able to recover thanks to local support, but the results of insufficient main power could have been tragic. Plan your ac mains current demand based on all stations transmitting simultaneously.

We arranged to store materials on the island in advance of the operation. This limited the amount of material requiring transport immediately prior to the contest, which worked out very well.

Choose Your Team Members Carefully

Have you recruited skills, knowledge and abilities that best support your goals?

Is it critical to your operational success for your team members to have solid contest operating skills and confidence, or can you utilize motivated trainees?

Have you addressed the critical importance of a team mentality *vs* individual mentality *in your team selection?*

Do you have enough team members with the physical and technical skills to install all equipment, masts, antennas, computers, network and solve inter-station interference problems?

Do you have one or more team members with solid "people skills" whom can help with motivation and conflict?

Are your team members open to new ideas, prepared to learn and accept feedback?

Are all operators available to participate in pre and post contest on-site duties (antenna and station disassembly, debriefing, etc)?

I could easily write a book on this area alone, just from our IH9P experiences. It's not easy developing a cohesive team from a group of people, representing different cultures, and who have never worked together. We relied heavily on personal recommendations from other team members and acquaintances, plus a reasonably extensive screening process by the team leaders. Overall, this worked pretty well. Next year we plan to keep the same concepts, but ask prospective operators to submit information which speaks to their experience level in a number of areas, and their response to the stated team goals (and how they can support attainment of these goals). This may seem overly formal and bureaucratic, but you must avoid selecting someone who cannot (or will not) work toward team goals. A team selection process/checklist might be a good addition for the *NCJ* Contest DXpedition Website pages (Joe? anyone?).

How you recruit and grow your team is an important consideration. Discussing this subject with other M/M planners, there seem to be two extremes. You can grow a team by working on improving the skills of the original operators over time (the evolutionary track). The other extreme is to keep the top performers, toss out the others and recruit the additional talent you need (like many professional sports teams). We decided to select a mix of team members for IH9P. Several were WRTC operators with solid contest operating skills and confidence; others had contest experience, but were somewhat down the learning curve. This provided a great mix of talents that we exploited during the selection of certain band teams by matching varied skill levels. I saw remarkable skill growth among all the lesser-experienced contesters over the 48-hour contest that I know would translate into even better scores next year.

We were shocked just how long it takes to assemble a M/M station and antennas once the team arrives on site. Our 1998 effort involved 10-15 people, beginning mid-Monday and finishing 5 hours before the contest. Thankfully, most of the team was on-site Tuesday or Wednesday or we might not have made the contest start with everything prepared and tested. I believe it's absolutely critical that skilled, physically fit team personnel are available well in advance for set-up, and available at least two days after the contest for station disassembly. We had all the critical skills required except for network support (which was planned, but the op needed to pull out at the last minute). We even had a professional engineer (KR7X) providing invaluable support in antenna raising and safety, an MD, IT9WPO (in case something went REALLY wrong), and a psychologist (Dr. WA7EQW) in case people started killing one another! These guys were great operators during the 48 hours and strong contributors during station assembly.

Next issue, we'll get into General Planning and other critical details of the planning process.

73, Joe, K8JP ■

Contest DXpeditions List

Dennis Motschenbacher, K7BV
k7bv.aol.com

Some good news! No more major hassles operating portable from those *F stops* around the globe. This change happened quietly so go ahead and book those seaside cottages right away!

"The French Republic shares a reciprocal licensing agreement with the United States. Effective May, 1998, no licensing is required for visits of less than 3 months. To operate, you would sign 'F/Your Call Here/P' (example F/KC1J/P). Permits are issued for periods of 3 months for short-term visitors or 1 year for residents. Only residents are eligible for full French call signs, such as FD1XYZ, while short term visitors sign F/W1AW, FP/W1AW, etc."

Visit the ARRL web site **http://www.arrl.org/field/regulations/io/recipinfo_e.html** for information on obtaining operating permits for these countries or others on your travel itinerary.

The *NCJ* Contest DXpedition list is updated frequently. Visit the *NCJ* website **http://www.vramp.com/~ncj** to view the latest listing.

Contest	*Category*	*QTH/Call*	*Operator(s)*	*Status*
CQ WPX CW	SOABHP	8P	YT6A	Firm
CQ WPX CW	SOABHP	OH0Z	K7BV	Firm
CQ WPX CW	SOAB?	OJ0	OH1VR	Firm
CQ WPX CW	SOABHP	WP2Z	N5TJ	Firm
CQ WPX CW	SO/?	ZF2NE	W5ASP	Firm
CQ WPX CW	SB/10M/LP	EA8	9A4KK	Firm
CQ WPX CW	SB80M	IH9/OL5Y	OK1FUA	Firm
CQ WPX CW	M/S	VP5GA	N2GA, K2DO	Firm
IARU	SO/?/HP	WP2Z	AG8L	Firm
IARU	SOABHP	8P0V	K7BV	Firm
NAQP CW	SOAB	WP2Z	KD4D	Firm
WAE DX CW	SOAB	WP2Z	KD4D	Firm
CQWW SSB	SOABHP	VO2GJ (zone2)	W0GJ	Plan
CQWW SSB	SB/160M	FS/N7KG	N7KG	Firm
CQWW SSB	SOABHP	8P	W2SC	Firm
CQWW SSB	M/S	C6	K9VV, KB9QQL	Firm
CQWW SSB	M/M	CN8WW	Bavarian Contest Club	Firm
CQWW SSB	M/?	FS/K7ZUM	K7ZUM, KD7BSW, KC7TWZ	Firm
CQWW SSB	M/M	IG9	IQ4A, IR4T, IR2W, II3T	Firm
CQWW SSB	M/M	IH9P	IT9BLB + Intl Team	Firm
CQWW SSB	M/M	PJ9B	N3ED +	Firm
CQWW SSB	M/M	VP5T	N2VW, WA2VYA +	Firm
CQWW SSB	M/S	WP2Z	K0XQ, KT0R, UA9AR	Firm
CQWW CW	SOAB/?	6Y5	KN5H	Firm
CQWW CW	SOABHP	8P9Z	K4BAI	Firm
CQWW CW	SOAB/?	T32	KR1G	Firm
CQWW CW	SOABHP	WP2Z	WD5N	Firm
CQWW CW	SOABHP	XU or 3W	K7BV	Firm
CQWW CW	SO/?	ZF2NE	W5ASP	Plan
CQWW CW	M/S	C6A	N7NU, N7MQ, K7AR, WJ7R	Firm
CQWW CW	M/M	CN8WW	Bavarian Contest Club	Firm
CQWW CW	M/M	PJ9B	N3ED	Firm
CQWW CW	M/S	TI5N	K9VV, K6CT, K4UEE etc	Firm
CQWW CW	SB80M	IH9/OL5Y	OK1FUA	Firm
ARRL 10M	SO/?	8P	N0JK	Firm
ARRL 160M	SO	T32	KR1G	Firm
2000				
CQ 160M CW	SOHP	8P9DX	VA3DX	Firm
ARRLDX CW	SOABHP	8P9JJ	K7BV	Plan
ARRL DX SSB	SOABHP	8P	W5AJ	Firm
ARRLDX SSB	SOABHP	FS	W0GJ	Plan
CQ WPX SSB	SOABLP	VP5E	K6HNZ	Firm
CQ WPX SSB	M/S	8P9JA	K4MA +	Firm
CQ WPX CW	SOABHP	8P	YT6A	Firm
CQWW SSB	M/S	8P	K4FJ, K3KG	Firm
CQWW SSB	M/M	IH9P	IT9BLB + Intl team	Firm
CQWW SSB	M/M	PJ9B	N3ED +	Firm
CQWW CW	SOABHP	8P9Z	K4BAI	Firm
CQWW CW	SOABHP	WP2Z	WD5N	Firm
CQWW CW	M/M	PJ9B	N3ED +	Firm
ARRL 10M	M	8P9Z	K4FJ, K3KG	Firm

Thanks to ARRL DX Bulletin, Ohio/Penn DX Bulletin, 425DXN, Bill Feidt/NG3K and the DXNL.

Contest Calendar

Bruce Horn, WA7BNM

Here's the list of major contests to help you plan your contesting activity through August 1999. The web version of this calendar is updated more frequently and lists contests for an extended period of time. It can be found at: **http://www.hornucopia.com/contestcal/**.

Although the ARRL is no longer sponsoring the VHF/UHF spring sprints, others have stepped in to provide sponsorship, so these contests are still alive. Do you operate in the same contests year after year? For some variety, pick a contest that you've never operated in. You may be pleasantly surprised. There are many possibilities: from 4-hour sprints to 48-hour marathons.

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!

May 1999	
MARAC County Hunters, CW	0000Z, May 1 to 2400Z, May 2
10-10 Int. Spring Contest, CW	0001Z, May 1 to 2400Z, May 2
Massachusetts QSO Party	1800Z, May 1 to 0400Z, May 2 and 1100Z-2100Z, May 2
ARI International DX Contest	2000Z, May 1 to 2000Z, May 2
902/1296/2304 MHz Spring Sprint	0600-1300 local, May 8
VOLTA WW RTTY Contest	1200Z, May 8 to 1200Z, May 9
Oregon State QSO Party	1400Z, May 8 to 0400Z, May 9
FISTS CW Club Spring Sprint	1700Z-2100Z, May 8
CQ-M International DX Contest	2100Z, May 8 to 2100Z, May 9
EU Spring Sprint, CW	1500Z-1859Z, May 15
50 MHz Spring Sprint	2300Z, May 15 to 0300Z, May 16
Major Six Club Contest (6 meters)	2300Z, May 21 to 0300Z, May 24
Texas QSO Party	1400Z, May 22 to 0500Z, May 23 and 1400Z-2000Z, May 23
Baltic Contest	2100Z, May 22 to 0200Z, May 23
CQWW WPX Contest, CW	0000Z, May 29 to 2400Z, May 30
June 1999	
IARU Reg 1 Field Day, CW	1500Z, Jun 5 to 1500Z, Jun 6
ANARTS WW RTTY Contest	0000Z, Jun 12 to 2400Z, Jun 13
Portugal Day Contest	0000Z-2400Z, Jun 12
VK QRP Day	0700Z-1200Z, Jun 12
TOEC WW Grid Contest, SSB	1200Z, Jun 12 to 1200Z, Jun 13
Asia-Pacific Sprint, SSB	1230Z-1430Z, Jun 12
ARRL June VHF QSO Party	1800Z, Jun 12 to 0300Z, Jun 14
All Asian DX Contest, CW	0000Z, Jun 19 to 2400Z, Jun 20
Kid's Day Contest	1800Z-2400Z, Jun 19
West Virginia QSO Party	1800Z-2400Z, Jun 20
Marconi Memorial HF Contest	1400Z, Jun 26 to 1400Z, Jun 27
ARRL Field Day	1800Z, Jun 26 to 2100Z, Jun 27
July 1999	
RAC Canada Day Contest	0000Z-2400Z, Jul 1
Venezuelan Ind. Day Contest, SSB	0000Z, Jul 3 to 2400Z, Jul 4
IARU HF World Championship	1200Z, Jul 10 to 1200Z, Jul 11
CQ Worldwide VHF Contest	1800Z, Jul 10 to 2100Z, Jul 11
Colombian Indep. Contest	0000Z-2400Z, Jul 17
SEANET WW DX Contest, CW	0001Z, Jul 17 to 2359Z, Jul 18
Pacific 160-Meter Contest	0700Z-2330Z, Jul 17
North American QSO Party, RTTY	1800Z, Jul 17 to 0600Z, Jul 18
Six Club 6-Meter Sprint	2300Z, Jul 17 to 0400Z, Jul 18
Venezuelan Ind. Day Contest, CW	0000Z, Jul 24 to 2400Z, Jul 25
IOTA Contest	1200Z, Jul 24 to 1200Z, Jul 25
August 1999	
YO DX HF Contest	0000Z-2000Z, Aug 1
WAE DX Contest, CW	0000Z, Aug 7 to 2400Z, Aug 8
10-10 Int. Summer Contest, SSB	0001Z, Aug 7 to 2400Z, Aug 8
European HF Championship	1000Z-2200Z, Aug 7
ARRL UHF Contest	1800Z, Aug 7 to 1800Z, Aug 8
North American QSO Party, CW	1800Z, Aug 7 to 0600Z, Aug 8
SARTG WW RTTY Contest	0000Z-0800Z and 1600Z-2400Z, Aug 21 and 0800Z-1600Z, Aug 22
SEANET WW DX Contest, SSB	0001Z, Aug 21 to 2359Z, Aug 22
ARRL 10 GHz Cumulative Contest	0800-2000 local, Aug 21 and 0800-2000 local, Aug 22
North American QSO Party, SSB	1800Z, Aug 21 to 0600Z, Aug 22
TOEC WW Grid Contest, CW	1200Z, Aug 28 to 1200Z, Aug 29
SCC RTTY Championship	1200Z, Aug 28 to 1200Z, Aug 29

RTTY Contesting

Jay Townsend, WS7I
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WS7I

Spring has arrived, and two ingredients that keep the pot boiling on contest weekends are changes—and the optimism generated by those changes. Through the efforts of Mary Lou Brown, NM7N (now a Silent Keyboard), Frank Fallon, N2FF, and the brand new ARRL Contest Director Dan Henderson, N1ND, a new plaque program was in place for the 1999 ARRL RTTY Roundup. It's impressive the things that Dan has helped accomplish for contesting in such a short time. Plaques do generate a lot of interest.

Just prior to the fifth running of the WW RTTY WPX contest, word was received that the current contest sponsor, *The New RTTY Journal*, had joined forces with *CQ Magazine* as joint sponsors. Guess *CQ* liked our format of one point for domestic QSOs. This format is now found in all WPX contests. Results will continue to be available prior to the Dayton Hamfest—a short 90 days after the contest (this is for the RTTY WPX!). The new contest will be known as the CQ/RJ WW WPX, I believe.

Rumblings During and After the Contests

"Splatter, terrible signals, pirates, QRM, the bands were wide open on 10 and 15 meters." All this was found in the recent RTTY WPX. Bad signals will be discussed later under *TNCs* and *FSK vs AFSK*, but the bottom line is that times are once again good. Crowds are showing up in each and every contest, records are being smashed and good fun is being had by all.

During RTTY WPX I found AM signals on 10 meters. These signals were not taxis but what sounded to me to be truck drivers. They were complete with reverbs and echo chambers. During one slow point, as I was looking for multipliers in the contest, I found no less than 20 AM signals in the tiny RTTY band. Bet they will not stay around too long as we start using all of our bands again...

Why RTTY Contesting?

Why?—because it's fun! RTTY contests are a bit different than those on CW and SSB. Being the new guy on the block, we are able to take most of the good things and perhaps modify them a bit, making RTTY contesting more interesting. Maybe it's because RTTY offers a more level playing field.

Sage Advice

Ed Gray, W0SD, recently stated, "After being at this thing for nearly 40 years I know the real hero is the guy that gets on and works 5 to 10 hours and has fun! If you take all those fellows away, contesting would be *NOTHING, I TELL YOU, NOTHING!* So, to you fellows that keep on getting in the contests—never intending to win, just remember if it was not for you, contesting would wither and *DIE!*" Ed goes on to say that these guys should pat themselves on the back and say, "I helped get that Top 10 winner up there because I got on and worked him."

So why is RTTY contesting fun? John, WA9ALS, was shocked when after the recent ARRL RTTY Roundup he started receiving QSLs from guys needing Indiana for WAS RTTY. He felt like DX and couldn't remember the last time anyone actually *needed* his card. John's advice is to get on and go for it as soon as possible. John's like many of the increasing RTTY contest crowd—he got a new TNC for Christmas and started playing with it. After making hundreds of new friends and joining new reflectors—getting immersed in propagation, DXing, new programs, and using that old rig again—he's found new life in ham radio.

What TNC to Use?

So are you thinking of trying your hand at RTTY and RTTY contesting? What should you use for a TNC? The various TNC manufactures are going to be happy. I recently conducted an informal survey of which device current RTTY contesters would recommend for someone starting out. The Kantronics KAM Plus received many votes; the Hal Communications DXP38/P38 received a large vote. Other Hal products were popular choices—computer sound cards are also a favorite. The units that you can find in abundance at hamfests, like the PK232, were also chosen and recommended, based mostly on price.

From the sound card to the black box—they all basically do the same thing, decode and generate RTTY. Long discussions often take place on the many reflectors on which unit is best. It has long been my opinion that it's best to go ahead and pick one, learn how to hook it up to your radio, and just use it!

AFSK vs FSK and Sound Cards

First, this is an old story and often argued about. There is very little difference in general between AFSK and FSK on a modern transceiver. In fact, many that think they are running FSK are actually doing AFSK. (A common misconception among many FT-1000D RTTY operators.)

Years ago, while participating in a multi-single RTTY contest at WA7EGA's, I answered the shack phone. The party on the other end indicated that he was with the FCC and asked if Mr. Howard Blegen was available. Quickly, I handed the phone to Hal. Hal's fine old Kenwood Twins were transmitting on 14.088 *and* on 13.397—a US Air Force frequency. The guy was pretty nice and after a bit of testing we went QRT. This was easily the most interesting end to a contest effort I have ever been involved with. Hal sold the Kenwood Twins at the next opportunity. Turns out some modifications on the radios weren't quite up to snuff.

Here is the typical problem. Your sound card or AFSK/LSB audio source can create problems if it contains distortion products. It used to be that the main cause was that the audio compression or speech processor was inadvertently left on. No longer—now it's generally a sound card being driven incorrectly, typically with far too much audio level.

Upcoming RTTY Contests

Contest	*Dates*	*Starting Time*	*Ending Time*	*Operating Period*
ARI (Italian)	May 1-2	2000Z Saturday	2000Z Sunday	No off times
Volta (Italian)	May 8-9	1200Z Saturday	1200Z Sunday	No off times
ANARTS (Australian)	June 13-14	0000Z Saturday	2400Z Sunday	30 of 48 hours
Field Day (ARRL)	June 26-27	1800Z Saturday	2100 Sunday	No off times (see rules in May 1999 *QST*)
RTTY North America QSO Party	July 17-18	1800Z Saturday	0600Z Sunday	
Russian RTTY WW Contest	July 24-26	0000Z Saturday	2400Z Sunday	

To further complicate things, the sound card generated RTTY often does not sound bad to the ear. What's happening is often outside of our audible audio range. This is further complicated when low tones are used. Low tones seem to be the latest RTTY rage. The problem is that this can put many harmonics inside the passband filters of the SSB transmitter. Dick, N1RCT, who was last issue's guest author, has an extensive discussion of this on his Web page. If you are running RTTY on a sound card—by all means stop by the site and review this material. One station in WPX RTTY actually had up to 10 image signals on the band—not a good way to impress others and win a contest. Folks were calling all over—and he, of course, was only listening in one place.

Interfacing

Hooking things up is pretty easy these days. Most transceiver and RTTY controller manuals have detailed instructions on what goes where. Here are a couple of hints: push-to-talk can usually be wired to the transceiver's foot switch connection. I use a Y cable. Receive audio is usually taken from either a fixed level audio output or from the external speaker. The only remaining connection is either FSK input or audio in (microphone). These are usually not hard to find.

RTTY Bands: or *What Frequencies to Use*?

Perhaps now is a good time to explain the RTTY bands. They are similar to the CW sub bands—but then again, they differ (sigh; isn't anything ever easy)? For example, on 20 meters 14.000 to 14.150 MHz is the RTTY band. You may not use digital modes above 14.150—unlike CW, which can be used anywhere. (Do not try asking an SSB contact to switch modes for a quick RTTY QSO on the same frequency.)

Usually, on most bands, the range of .061 to .099 is considered the RTTY segment. During RTTY contests, the RTTY segments can get quite a bit larger than they are normally. On 40 meters, there are two areas—approximately 7.070 to 7.099 and 7.027 to 7.045. DX on 40 was usually found in the lower range, but in recent contests they have been showing up on both ends of the band.

Well, I have to bore you for a second with a little semi-technical data. The RTTY signal is made up of a mark and a space. These are usually 2125 and 2295. The difference is called the shift (170 Hz). One of the tricky parts of RTTY (and one of the first *gotchas*) is LSB vs USB. The long time convention is to either use the radio's FSK or RTTY position or to use LSB. If you're transmitting on USB you will be upside down. LSB vs USB is also the reason why DX spots and discussions often differ by 2.1 kHz—14.085.6 becomes 14.087.7. Not that any of this matters. Use LSB or the FSK/RTTY position on your radio—on all bands.

You have probably seen this more than once in my column—*use narrow CW filters*—500 Hz at the minimum, and 250 Hz if you are very serious. I can only tell you that if you take no other advice from me, do this and you will be rewarded.

You'll find a lot of old timers on RTTY—guys and gals who are a little hard of hearing (some say from the clank of the old machines), some with sight that's not so good, some who have trouble speaking, and a lot of them (at 80 years young or so) who are not quite as fast on CW anymore. They may find it a struggle to call CQ on SSB for a couple of hours. These folks can all sit back, watch the mark and space on the scope or the print on the screen, and enjoy participating in RTTY and RTTY contesting.

When you're just starting out, it helps to have a RTTY guru, someone that can lend you a helping hand with choosing hardware and software and getting it all put together and on the air. The Internet is a good starting place. Put out a query on the reflector—see who answers—and start asking away. You can also try contacting some of the folks who have done columns in the *NCJ*. Program authors usually aren't the best choices for help when you are just starting the next version of their programs. RTTY users are usually a much better source for basic information.

Do not start putting together your RTTY contest station the day before the contest. Get comfortable with the new equipment and software. Fire up the amp and check on the RF levels in the shack. I highly recommend installing those nice little black snap on torrids on most of your cables. RTTY takes a few wires.

Work a little RTTY DX. Find out what the band sounds like when there are more than 10 guys on. Mike, K4GMH, suggests that knowledge of the bands and their conditions during the contest can be a great equalizer. Get on the bands and see when RTTY stations are around—it is a bit different than with the other modes.

Contest Software

This topic has been pretty well covered in the last year so I will not dwell on it here. Probably the most important thing is to set up all of this stuff ahead of time and get used to it. I would highly recommend connecting a dummy load and actually practicing a bit off the air.

Jay's Tip for Increasing Your Score

What seems like a heck of a long while ago, a guy that I contested with and I developed some "highly scientific calculations" which gave us a huge advantage in contests. I want to share this with you. After several years of RTTY contesting, we found that in order to win *all you need to do is score more points than everyone else does!* This really amounts to just getting more QSOs and more multipliers. So go for it. ■

Contest Tips, Tricks & Techniques

Gary Sutcliffe, W9XT
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Tips for Beginning Contesters

There is a lot to learn when you are just starting out in contesting. Where do you start? What suggestions do you have for starting contesters? That is the subject of this installment of CTT&T.

Patience and Practice

Although patience is something that seems to be frequently forgotten in these days of instant gratification, don't expect to become an expert contester and make the Top 10 boxes your first few times out. You wouldn't expect to earn a spot on the PGA tour after completing your first 18 holes of golf. Don't expect it to happen in contesting either. Most of the top contesters have been refining their craft for many years, often decades.

Dave, G4BUO, thinks that almost all of the big guns started out as little pistols and owe much of their success to the lessons they learned early. K0OU suggests not worrying about the top guys, but instead concentrate on beating your previous year's score or competing with your buddy across town.

Practice, practice, practice. K5ZD suggests operating every contest you can and learning everything you can. Get on in the smaller contests for an hour or two and work on improving a specific skill such as fast S&Ping, running stations, quick band changes, multiplier hunting or whatever. At the minimum you will learn more about your station and propagation.

Don't consider contests as *just* practice, however. You can use contests as tools for working towards other goals such as DXCC or 5BWAS. N2MG notes that in just a few weekends of DX contesting you can complete your DXCC and be well on your way to a 5BDXCC or WAZ.

Listening

Spending a lot of time on the air both inside and outside of contests was a common suggestion on this month's topic. Most of that time should be spent listening. You can't learn much with your mouth open. This also applies to your hand on the keyer.

K9QQ believes that good listening skills are what gives him his edge. Brian honed these skills by spending hours tuning the bands and listening. He learned propagation and different operating styles. These skills help him immediately recognize the difference in sound between a QRP W6 and a 100 W rare Asian station.

He recalls one multi-op effort where he was working all the rare multipliers, while the other operators were only working the strong common DX stations. Someone finally asked him why he was getting all the rare stuff. Brian's response was "because I listen." In today's world of packet pileups, being a good listener is a distinct advantage.

NM5M says new contesters should concentrate on learning to listen for the weak stuff. That is where the best multipliers can usually be found. It is also a lot easier to work a weak DX station soon after he gets on or as the band first opens to him than it is after everyone else finds him.

W4CE and W2GD suggest listening to top rated operators on the air. Listen carefully to their techniques. Try to emulate their finer points. N2MG makes a similar suggestion but adds that the beginner should also observe the techniques of the stations trying to get through the pileup. Mike suggests you listen to see how the successful operators get through. Do they use brute force? Do they use skillful timing? Do they call a bit off frequency? Perhaps they were just persistent and got through when the pileup thinned out.

Learn from Others

One of the best ways to learn contesting skills is from other contestors. Seek out those in your area. Join a local contest club if there is one. K5ZD says that you really learn a great dealt from local contesters. They know what works from your region. N5KB suggests trying to find a contest Elmer.

Operating with a multi-op is also a great way to learn. John, W2GD, says that after nearly 40 years of contesting he still learns new things from operating with others.

With the exception of Field Day, over the last 15 years or so I've done almost all of my contest operating single op from my own station. A couple of years ago I started making a point of joining multi-op efforts at least once a year—just for the learning experience.

N0AX says you should not wait to be asked, but should call and volunteer to be part of a multi-op team. Ward notes that even the most serious teams usually have a need for multiplier tuners and there will probably be some dead times that you can get some time in the main chair to cover for someone. Ward goes on to say that being part of a team like this helps the little guys learn that the big guns put their pants on one leg at a time too!

Back when I was in college at the University of Wisconsin in the mid 1970's, I was fortunate enough to be at a school that had one of the best contest stations of that time (W9YT). There were also a number of top operators there. I used to go there during Sweepstakes and other single operator contests to just listen. I would plug in a second set of headphones and quietly take notes while the operator did his thing. It was very instructive.

Sometimes after the contest I would ask the operator why he did such and such. *Q*: Why did you QSY to a different band when the rate was still pretty good? *A*: I still needed some multipliers and that band didn't have propagation to those areas. If I didn't work those mults at that time, I would probably never get them. *Q*: Why did you work the weak guy who answered your CQ first instead of the strong one? *A*: The weak one had a flutter to his signal and was likely to be a new multiplier. *Q*: OK, but then a few minutes later you worked a fast strong guy first. Why the difference? *A*: I recognized the fast guy's call. He is a good op. I knew that I could complete the QSO quickly. The slower guy was more likely to stick around while I completed the QSO.

Some of these types of things can take you a long time to figure out by yourself.

Which Contests?

Every contest provides an opportunity to learn something. Since there is one contest or another practically every weekend, there are plenty of chances to improve your skills.

Although most hams get their first experience with contests in Field Day, opinions are mixed on its value in improving contest skills. On the plus side—there *are* lots of stations to work, a simple exchange and strong signals. The negative side is that the average participants in Field Day are pretty poor operators. It is hard to pick up good contest operating techniques by operating with the typical Field Day group. Even the maximum rates achievable are limited not by the number of stations available, but by the skill of the stations worked.

Domestic contests are recommended by a number of contesters including PY2NY. Contests like Sweepstakes and the NAQPs were frequently mentioned. AA0CY suggested the WPX contests. W4CE even noted that the WPX has a rookie class.

A few contesters who have been around awhile mentioned that they learned their craft in the CD Parties. CD Parties were open to ARRL station appointees and held quarterly. Many a contester got a station appointment (OO, ORS, etc) just for the purpose of operating these contests. The annual Open CD Party was open to all ARRL members and was probably the most popular domestic contest after Sweepstakes and Field Day.

G4BUO and others mentioned single band contests. W2GD suggests 10-meter and 160-meter contests since modest beams are effective on 10, and simple wire antennas are the norm on 160. VK5GN likes single band contests as you spend the whole time on one band and consequently learn a lot about it.

DX contests can be frustrating to the beginning contester with a modest station. It is not fun to sit in pileups with little success. With the proper attitude and goals, these contests can still be very valuable. W2GD notes that it can take years to master propagation, and he still makes mistakes that cost him multipliers. K9NW agrees, noting that domestic contests don't teach you the best time to look for a VU on 40 meters.

Another option for DX contests is suggested by K7BV. Dennis found single country DX contests to be lots of fun in his early contesting days. These put enough DX stations on the air for long enough periods of time that the pileups eventually die down and give the little stations a chance to get through.

State QSO parties offer a good chance for contest practice. AA0CY, KE4OAR and K7BV recommend them. There are a number of nice things about state QSO parties. They tend to be somewhat more relaxed than the major contests. You also have a good chance to win a certificate, especially if you are an out-of-state contestant.

Your own state QSO party can also offer lots of action. In your state QSO party *you* are the sought out station. You become the rare DX multiplier without leaving your shack! That can lead to high rates. In the recent Wisconsin QSO party I averaged over 90 QSOs/hour for the entire 7 hours of the contest. With my station, located in the "Black Hole," getting even a single 90 QSO hour in most contests is a rare event!

K7BV and KU7Y endorsed QRP contests. They provide a place for little pistols to compete against each other. K7BV thinks that QRP contests provide valuable lessons on getting through under difficult conditions. KU7Y likes them because of the low pressure, lower CW speeds and the potential for minimal equipment investments.

W2GD warns against beginners trying to compete in the QRP class of major contests. John thinks that this could be too frustrating for those just starting out, and compares it to playing golf when you don't even know the basics.

CW contests are often recommended for small pistols. Weak CW signals often get through much easier. The smaller signal bandwidth gives everyone more room to operate. This can be an important factor on bands like 20 and 40, where it gets pretty crowded on phone when those are the only bands open. It is always more difficult for the smaller and less experienced operators to compete when band space is scarce.

N2MG notes that CW contests can be pretty intimidating to the new contester. Besides all the normal pressures of contesting you have high code speeds to contend with. Mike suggests listening to several exchanges if necessary to get the information. He goes on to suggest you take special care to make sure you have the call correct. Is that HG3DX or 5G3DX? If you are using packet spots, verify that the posted call is correct. The number of busted calls on packet seems to get worse with every contest.

KA2AEV observes that there are a tremendous variety of contest types these days—including mode or band specific contests, DX contests, state QSO parties, VHF contests, to name a few. Mike suggests that you should try them all to see which ones pique your interest. Then dive in with a vengeance!

More to Come

This topic generated a large number of responses. There is more good material than I can fit into the space of a single column, so we will continue with *Part 2* next time. Some of the specific subtopics still to be covered will include learning to run stations, the mental aspects of contesting and a collection of useful hints that don't fit into any of the general subtopics. If you missed sending in your comments the first time, you get a second chance!

Thanks as always to CTT&T readers who passed along their ideas on tips for beginning contesters. This installment's contributors were AA0CY, G4BUO, KA2AEV, KE4OAR, K4OGG, K5ZD, KU7Y, K7BV, K9NW, K9QQ, K0OU, NM5M, N2MG, N5KB, N8YYS, N0AX, PY2NY, VK5GN, W2GD, W4CE and W6TKV.

Topic for July-August 1999 (Deadline May 8)

Tips for small pistols and new contesters - Part 2

What suggestions do you have for the small pistols and beginning contesters? Specific topics include learning to run stations and the mental aspects of contesting.

Topic for September-October 1999 (Deadline July 10)

Domestic contest strategies

What special strategies do you use for domestic contests such as Sweepstakes, NAQP and the Sprints? Which are your favorite domestic contests and why? What operating class do you prefer? What antennas do you find most effective for each band?

Send in your ideas on these subjects or suggestions for future topics. You can use the following routes: Mail —3310 Bonnie Lane, Slinger, WI 53086. Internet—**w9xt@qth.com**. Please be sure to get them to me by the deadline.

NCJ Profiles

(Continued from page 24)

(representing Finland), C21BH, TF3IRA, etc. Recently we were at J3A—another great gang of ops doing M/M from Grenada."

The operations have involved some savvy operators. "Hey, these guys are all seasoned DXpeditioners and the amazing thing is that they 'all know what to do'! No boss required! The most amazing guy to me is Mats, SM7PKK—he has had 15 years of DXpeditionary experience! This guy is fantastic! Unbelievable! What do I have for future plans? Go do TF3 again, maybe some other crazy place."

The enthusiasm pretty much radiates from Hillar—who makes a swell barbeque, as well. When you've seen and done as much as he, it's amazing how much he still loves the adventure, planning a water-borne invasion of super-rare Tatoosh Island (IOTA NA-169) this summer. I asked him what keeps the ticker tocking. "I'll quote Martti, OH2BH, 'I've done it all, but now and then a small bug comes along and I want to do it again—it's agony—I don't have to prove anything any more—but—why not?' And I hope to do it again for years and years to come!" ■

International Contests

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Contest Popularity

Recently I ran across an interesting newsletter written by Jorma Saloranta, OH2KI. Jorma is the Chairman of the Region 1 HF Contest Sub-Group of the IARU. Apparently he had made a survey of the level of participation reported in a group of HF contests held each year. His article was dated January 1999. Here is what he found.

Class A - Worldwide Contests (Over 1,000 logs)

CQWW SSB	3482 logs	(1997)	
CQWW CW	3274 logs	(1997)	
ARRL DX	3142 logs	(1996)	Combined CW+SSB
CQ WPX SSB	1600-1800 logs		
IARU Championship	1503 logs	(1997)	
CQ WPX CW	1200-1400 logs		
ARRL 10M	1006 logs	(1998)	
RSGB IOTA	1000 logs	(1998)	
WAE	1134 logs	(1998)	CW: 578 logs, SSB: 556 logs

Class B - Continental Oriented Contests (500-1000 logs)

UBA	900 logs	(1997)	Combined CW+SSB
SAC	797 logs	(1997)	CW: 485 logs, SSB: 312 logs
PACC	776 logs	(1997)	
OK/OM	550-650 logs		

Class C - Country Oriented Contests (Less than 500 logs)

ARI	387 logs	(1998)	
VK/ZL	295 logs	(1998)	Combined CW+SSB
EUHF (Slovenia)	287 logs	(1996)	Combined SSB+CW
Croatian CW Contest	196 logs	(1997)	
EU Sprint SSB	167 logs	(1997/98)	
Helvetia	177 logs	(1998)	
NRAU	120 logs	(1996)	
IARU Region 1 160M	70 logs	(1999)	

Looking over this summary, one can't help but once again be impressed by the immense popularity of CQ World Wide. It has over twice the popularity of ARRL DX. I was bit surprised to see WPX (CW+SSB) pushing ARRL DX for the number two slot, and IOTA has certainly made it into the big leagues now.

Among those contests ranked in the second and third tier it's reassuring to see that the Belgian, Dutch and Scandinavian events have such a strong following, ranking them close behind WAE. There are some good European contests not ranked—REF and the Russian. It would be interesting to see where our good friends in Asia; eg AA, JIDX, etc would fit into the rankings. In any case this should be added incentive for all contesters to broaden their horizons, and savor more of the international flavors.

1998 IOTA Contest

Island Multi-Operator - 24 Hour Mixed Mode

	Call	*QSOs*	*Mults*	*Score*		*IOTA*	*Island Name*
8	WP2Z	2,238	264	4,927,296	DX	NA106	St Croix
15	V26VG	1,647	227	3,007,750	Pe	NA100	Antigua
17	8P9IF	1,606	204	2,481,660	DX	NA021	Barbados
29	W4T	1,498	132	1,119,360	DX	NA079	Dry Tortugas
50	N2OO/2	586	98	387,394	DX	NA111	Long Beach Island
56	NP3G	451	80	292,400	Pe	NA099	Puerto Rico
60	K4EP/P	451	74	226,514	DX	NA112	Bogue Banks
63	VO1SDX	401	70	217,630	Pe	NA027	Newfoundland
64	VE1AO	489	66	206,910	DX	NA154	NS
69	KA2D	166	64	111,552	Pe	NA026	Long Island

Island Single-Operator - 24 Hour CW

7	KH2D	969	80	582,160	Pe	OC026	Guam
21	N6HR/7	361	55	153,560	DX	NA065	Whidbey
22	KF8TM/4	439	56	145,544	DX	NA062	Cudjoe Key

Island Single-Operator - 24 Hour Mixed Mode

8	N3OC/P	619	60	257,880	DX	NA139	Assateague
10	K1VSJ	410	69	187,887	Pe	NA046	Martha's Vineyard
14	W3SE/P	394	48	82,464	DX	NA144	Santa Cruz Island
17	N3DON	245	29	40,107	DX	NA140	Middle Hooper
20	WP4LNY	108	30	25,530	Pe	NA099	Puerto Rico

Island Single-Operator - 24 Hour SSB

18	VE1JS	509	79	317,659	DX	NA127	Long Island, NS
22	6Y3DA	708	54	258,660	Pe	NA097	Jamaica
24	VO1WET	391	72	223,128	Pe	NA027	Newfoundland
35	NH2A	113	32	47,840	Pe	OC026	Guam
36	KH6GMP	121	26	45,630	Pe	OC019	Hawaii

Island Single-Operator - 12 Hour Mixed Mode

8	WB8YJF	475	51	158,253	DX	NA067	Ocracoke
19	KK7JP	190	31	28,396	Pe	NA065	Whidbey Island

Island Single-Operator - 12 Hour SSB

4	KP2/AA1BU	742	97	503,818	DX	NA106	St. John
30	8P6CV	273	32	63,840	Pe	NA021	Barbados
32	KP4AH	130	37	57,340	Pe	NA099	Puerto Rico
39	NN2C	85	45	43,965	Pe	NA026	Long Island
40	VE7XO	70	38	32,490	Pe	NA036	Vancouver
44	NH6YK	60	27	18,927	Pe	OC019	Oahu
48	N2US/P	83	28	13,272	DX	NA140	Kent Island
61	VO1RE	15	10	2,050	Pe	NA027	Fogo

World - 12 Hour CW

	Call	*QSOs*	*Mults*	*Score*
9	K9QVB	422	59	186,971
64	VA3RJ	63	43	29,971
84	W2EZ	62	31	16,957
99	SP4GHL	35	21	8,400
116	K3WWP	21	10	2,250
120	N0QT			1,064
121	N0ED	6	6	384

World - 12 Hour Mixed Mode

13	N4UH	164	93	171,120
14	K1HT	193	85	169,745
23	K4BAI	164	70	122,500
29	WA1MKS	125	69	92,046
33	K9NX	107	62	78,120
37	N5KC	110	61	63,074
51	KO7X	172	29	34,597
64	K6III	50	29	17,806
66	N6JM	47	30	16,230

World - 12 Hour SSB

23	KA1UQ	248	48	94,176
37	VA3NR	88	57	66,120
52	AJ3M	135	41	47,191
65	KD2N	160	39	34,281
68	VE6IM	82	37	31,672
86	W1ENZ	57	31	17,732
94	VE4RP	81	17	10,591
95	N2LQQ	42	22	10,230
99	W8TTS	32	22	7,458

World - 24 Hour Mixed Mode

26	WB2YQH	256	105	268,485
41	K8GT	100	66	73,194
43	AA1SU	171	51	67,677

World - 24 Hour SSB

25	XE1MX	360	54	134,190
33	KB0C	125	74	104,932
36	K6ACZ	118	73	97,893
49	EA5CE	63	25	16,300
51	WA5ZKL	30	22	8,074

1998 WAE DX Contest - SSB

	Points	QSOs	QTC	Mults
USA				
Single Op				
K1CN	333236	748	720	227
KC1F	326826	813	813	201
W1OP	300949	610	589	251
KQ2M/1	151372	550	516	142
K1LZ	46992	197	159	132
AB1BX	13904	100	76	79
W2YR	193110	400	385	246
N2VW	184016	425	423	217
N2KJM	44756	167	167	134
W2OX	43860	172	168	129
N2LQQ	14457	92	91	79
K2SX	14384	118	114	62
W2UDT	2272	36	35	32
K3WW	222774	556	485	214
N3DL	204336	473	473	216
N3BNA	196808	472	112	337
K3AR	49692	202	202	123
K4BAI	167904	583	583	144
W4LC	52200	185	175	145
N4UH	16950	136	90	75
N3QYE/4	14620	90	82	85
W4ZW	6808	75	73	46
N4VHK	192	12	16	
K5YAA	104250	375	375	139
K5VG	294	11	10	14
N6AW	20700	116	114	90
WR6WR	768	32	24	
KO7X	8024	68	68	59
K7TG	1980	33	33	30
WZ8A	144508	397	397	182
W8KKF	79484	323	318	124
W4NTI/8	9360	93	87	52
N9RV	151340	546	535	140
KB0C/9	91234	319	319	143
KB9NHD	108	9	12	
WB0O	61880	260	260	119
K0DAT	8432	74	50	68
WB0YJT	5044	58	39	52
Multi Op				
KC1YR	1807496	2261	2213	404
N1AO	206787	463	440	229
W1MX	157815	479	466	167
AA8U	781200	1247	1233	315
Canada				
VO1MP	176040	999	957	90
VE2AWR	50784	184	184	138
VE2/LU7DW	50460	228	62	174
VE3AT	403965	1073	1042	191
VE3SY	109888	409	399	136
VA3IX	7990	85	94	
VE3BR	216	12	18	
VE5CPU	29648	136	136	109
VE5SF	14280	102	102	70
VE6DLX	4600	60	40	46
VE7FJE	4796	55	54	44
VE9FX	19596	194	90	69

1998 JIDX HF CW Contest

US

	Bands	QSOs	Points	Mults	Score
Zone 3					
K6XX	AB	295	336	85	28560
KC7V	AB	244	282	76	21432
W7YS	AB	130	137	51	6987
AB7RW	ABL	177	179	65	11635
AA7KF	ABL	155	156	54	8424
W7HS	ABL	108	108	50	5400
W6/JA3EVZ	21L	78	78	33	2574
KF6GUH	21L	30	30	17	510
Zone 4					
N7DR	AB	214	217	60	13020
WT8P	21	60	60	30	1800
K8UCL	21L	3	3	3	9
W8LYT	14L	2	2	2	4
Zone 5					
K3ZO	AB	52	151	57	8607
K2SX	AB	4	24	21	504
W1HIJ	21	113	113	38	4294
N4MM	21	61	61	32	1952
WO4O	21L	87	87	28	2436
N3TM	21L	35	35	21	735
WB2DVU	21L	26	26	18	468
Canada					
VA3JFF	21L	2	2	2	4
VE6JO	14	192	192	38	7296

1998 JIDX LF CW Contest

United States

	Bands	QSOs	Points	Mults	Score
Zone 3					
W7GG	AB	651	1088	121	131648
K6XX	AB	245	390	90	35100
K6HMS	AB	74	139	48	6672
AD6DO	7	344	344	43	14792
K6CU	7	195	195	42	8190
K6III	7	63	63	32	2016
N7OG	7	18	18	13	234
NK6F	7L	6	6	5	30
W7LNG	3.5	74	148	30	4440
KM6F	3.5	29	58	19	1102
K6ILM	3.5L	29	58	19	1102
N6AW	1.9	37	148	24	3552
Zone 4					
W5FO	1.9L	7	28	7	196
Zone 5					
K3ZO	AB	65	72	39	2808
Canada					
VE7BS	1.9	29	116	21	2436

1998 YO-DX (Romania) HF Contest

	Call	QSOs	Mults	Score	Category	
US						
1	K3ZO	117	69	54854	AB	**N.A. Leader**
1	K7TG	19	14	1344	20 M	
2	KB9HAY	20	9	504	20 M	
Check log: KG6NK, N2GM						
Canada						
1	VE2AWW	11	11	704	20 M	
Check Log: VA4IUL, VE7MR						

1998 SPDX (Polish) Contest

	Class	Score	QSOs	Mults
US				
K1CC	SOMB-MIX	85,248	592	48
AA3B	SOMB-MIX	55,695	395	47
K1BV	SOMB-MIX	7,069	76	31
W2OAE	SOMB-MIX	5,049	51	33
K4BAI	SOMB-MIX	1,620	30	18
K3ZO	SOMB-CW	13,716	127	36
N2CU	SOMB-CW	10,296	78	44
WQ7X	SOMB-CW	9,450	93	35
W4MOT	SOMB-CW	7,488	78	32
K3WWP	SOMB-CW	243	9	9
N3XOF	SOMB-SSB	13,158	102	43
KB3BRR	SOMB-SSB	10,413	89	39
W9ZEN	SO-14-CW	3,525	41	25
W8RSW	SOMB-CW	13,965	133	35*
KM5G	SOMB-CW	16,092	149	36*
KE1DZ	SO-14-SSB	30,360	220	46*
KB3BOU	SO-14-SSB	7,038	69	34*
NA2X	SO-21-CW	3,525	47	25*

* Late Entry

Canada				
VE3QAA	SOMB-CW	35,475	275	43
VE3XSP	SOMB-CW	30,873	254	41
VE1KB	SOMB-CW	7,047	83	29
VE3PLE	SOMB-SSB	12,987	117	37
VE3PEX	SO-14-CW	2,394	38	21
VE5CDO	SO-14-SSB	3,000	40	25
VA3ECH	SO-14-SSB	168	8	7

1998 Russian DX Contest

	Call	QSOs	Points	Mults	Score
11	KT0R	80	452	54	11029
CW					
33	AA3B	416	2465	173	276179
67	N4BP	270	1407	104	100201

	Call	QSOs	Points	Mults	Score
14 MHz					
15	VE6JO	204	1427	80	59772
33	K1BV	80	469	41	6765

1997 RSGB 21/28 MHz Contest

USA & Canada

			28 MHz			21 MHz	
	Call	QSOs	Mults	Points	Mults	Points	Score
CW							
06	N4AR	87	9	33	39	221	12192
12	K3ZO	43	8	30	25	99	4257
14	VE3HX	20	7	21	16	60	1863
24	N0ED	20	0	0	15	60	900
26	NS1I	17	0	0	51	16	816
27	VE2ATL	17	0	0	15	51	765
	W0YRN	7	0	0	7	21	147
	K3WWP	15	0	0	13	45	585
Phone							
08	N4UH	167	0	0	57	504	28728
	N4FRE	45	0	0	33	135	4455

Upcoming International Contests

ARI Italian International DX	01-May-99
CQ-M International DX Contest	08-May-99
European Spring Sprint CW	15-May-99
Baltic Contest	22-May-99
Portugal Day Contest	12-Jun-99
Top of Europe Grid SSB Contest (TOEC)	12-Jun-99
Asia-Pacific Sprint Phone	12-Jun-99
World Wide South America CW Contest	12-Jun-99
All Asian DX Contest - CW	19-Jun-99
RSGB 1.8MHz Contest - CW	19-Jun-99
Marconi Memorial Contest	26-Jun-99
RAC Canada Day Contest	01-Jul-99
Venezuela International Contest SSB	03-Jul-99
IARU HF World Championship	10-Jul-99
Colombian Independence Contest	17-Jul-99
SEANET DX Contest	17-Jul-99
Venezuela International Contest CW	24-Jul-99
RSGB Islands-on-the-Air (IOTA)	24-Jul-99

Notes

1) Check *QST* or *CQ* magazine for rules.
2) With few exceptions logs and summary sheets must be postmarked within 30 days of the contest.

North American QSO Party (NAQP) RTTY Rules

1) Eligibility: Any licensed radio amateur may enter.

2) Object: To work as many North American stations, and/or other stations if you are in North America, as possible. Non-North American stations can only work NA stations for multiplier and points credit.

3) Entry Classes: Single Operator, unassisted, 150 W maximum output. Multi-operator, two transmitters, 150 W maximum output. Use of helpers or spotting nets by single operator entries is *not* permitted. Single operator entrants may only have one transmitted signal at a time.

4) Contest Period: Third full weekend in July—1800Z July 17 to 0600Z July 18, 1999. Multi-operator stations must keep a separate log for each transmitter, and can operate for the entire 12-hour period, however they *must* remain on a selected band for at least 10 minutes (10-minute rule). Single operator stations may only operate 10 out of 12 hours. Off times must be at least 30 minutes in length and must be clearly marked in the log.

5) Mode: RTTY only.

6) Bands: 80, 40, 20, 15 and 10 meters only. You may work a station once per band.

7) Exchange: Operator name and station location (state, province or country).

8) Points: One point for each valid contact.

9) Multipliers: US States, including KH6 and KL7, Canadian Provinces and other North American countries. Canadian Provinces are: British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, New Brunswick, Nova Scotia, PEI, Labrador, Yukon, and NWT. Do not count USA, Canada, KH6 or KL7 as countries. Non-North American countries do not count as multipliers but may be worked for QSO credit. North American Station: Defined by the rules of the CQWW DX Contests with the addition of KH6.

10) Valid Contact: A valid contact consists of a complete, correctly copied and legibly logged two-way exchange between a North American station and another station. Proper logging requires including the time of each contact. Regardless of the number of licensed call signs issued to a given operator, one and only one call sign shall be utilized during the contest by that operator.

11) Scoring: Multiply total valid contacts by the total number of multipliers worked on each band.

12) Logs: (1) A summary sheet showing the number of valid contacts and multipliers by band, total contacts and multipliers, total score, team name (if any), power output, name, call sign and address of the operator, station call sign and station location. (2) A complete legible log of all contacts (including dupes marked as such) with indication of multipliers claimed. (3) A separate check sheet for each band. (4) A list of all claimed multipliers worked on each band.

Logs, summary sheets and check sheets may be home made or patterned after those published periodically in the *NCJ*. Logs may be submitted on disk in the form of files generated (.ALL .SUM etc) by WF1B program or MS-DOS ASCII files consisting of all information in (1)-(4) above if generated from a program other than RTTY by WF1B. All entries should include a written, signed statement of "Fair and Ethical Operation."

Send North American QSO Party RTTY logs to Ron Stailey, K5DJ, 504 Dove Haven Dr, Round Rock, TX 78664-5926 USA or e-mail logs to: **k5dj@contesting.com**. Entries must be postmarked not later than 30 days after the party to be eligible for trophies and awards.

13) Team Competition: Team competition is limited to a maximum of 5 single operator stations as a single entry unit. Groups having more than 5 members may submit more than one team entry.

Team preregistration requirement: To qualify as a team entry, the name, call sign of each operator, and call sign of the station operated, should the operator be a guest at a station other than his own (eg K1NG op by WF1B), must be registered with K5DJ. The team registration information must be in written, telegraphic or e-mail (**k5dj@contesting.com**) form and must be received before the start of the NAQP. There are neither distance nor meeting requirements for a team entry. The only requirement is pre-registration of the team.

14) Penalties and Disqualification: For each unmarked duplicate QSO, you lose that contact plus an additional three contacts. For each QSO for which you are not in the other station's log, you lose that QSO plus an additional one contact. For each QSO for which the log data is incorrectly copied in any respect, you lose that contact. Entries with score reductions greater than 5% will be disqualified. Any entry may be disqualified for illegibility, illegal or unethical operation. Such disqualification is at the discretion of the *NCJ* Contest Review Committee.

15) Awards: A plaque will be awarded for the highest score in each of the following categories.

Single operator NA: Sponsor Glenn Vinson, W6OTC

Multi operator NA: Sponsor *RTTY* by WF1B

Single operator DX: Sponsor Will Angenent, KN6DV

Multi operator/two transmitter DX: Sponsor *Writelog* for *Windows*

Best Name used in NA: Sponsor Eddie Schneider, W6/G0AZT (The name must be rated PG and not contain more than 10 letters)

Certificates of merit will be awarded to the highest scoring North American entrants from each State and Province, provided at least 200 QSOs have been logged. All certificate winners must verify their postal address with Shelby Summerville, K4WW, as soon as possible after the results are officially posted. Send this verification by mail to 6506 Lantana Ct, Louisville, KY 40229; or via e-mail to **K4WW@aol.com**. ■

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- Rear panel accessable 3 position switch selects ICOM, YAESU or KENWOOD mics.

Mic Input
- Rear panel accessible 8 Pin mic connector.
- Low impedance (600 ohms) input.

Mic Gain
- Accessible from bottom of the case. Adjusts internal mic amplifier gain.
- LED indicator facilitates gain adjustment.

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PTT Input (RCA jack)
- Rear panel accessible PTT input independent of the MIC Input. (can be used for a foot switch input)

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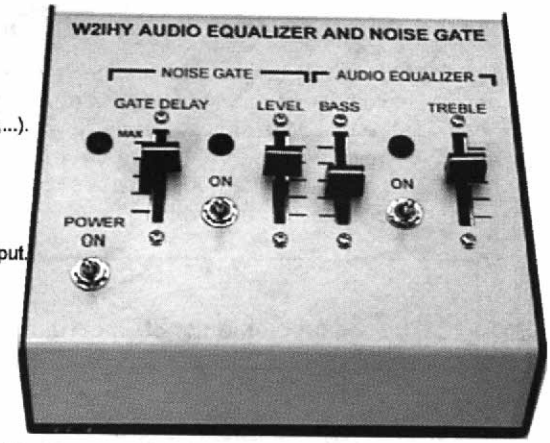
- Accessible from the bottom of the case. For use with electret condenser mics (example HM12, SM6,...). Provides 5 Vdc to the mic cartridge.

Mic Out Level
- Accessible from the bottom of the case. Adjusts the audio output level.

Mic Output
- Rear Panel accessible 600 ohm balanced audio output.
- PTT from PTT RCA jack and MIC IN.
- 5 pin DIN connector.

Power
- 7 - 14 Vdc (100ma) xfmr included
- LED indicator and on/off switch.



Only $99.99 - Kit or $129.99 - Assembled

Cable to radio $15.00 Plus $7.00 S&H

Mail orders and inquiries to:
Julius D. Jones (W2IHY)
19 Vanessa Lane
Staatsburg, NY 12580
Tel 1-914-889-4933
1-914-889-4253 (after 7pm)
E Mail: XUSK45A@prodigy.com

HOME PAGE: http://pages.prodigy.com/XUSK45A

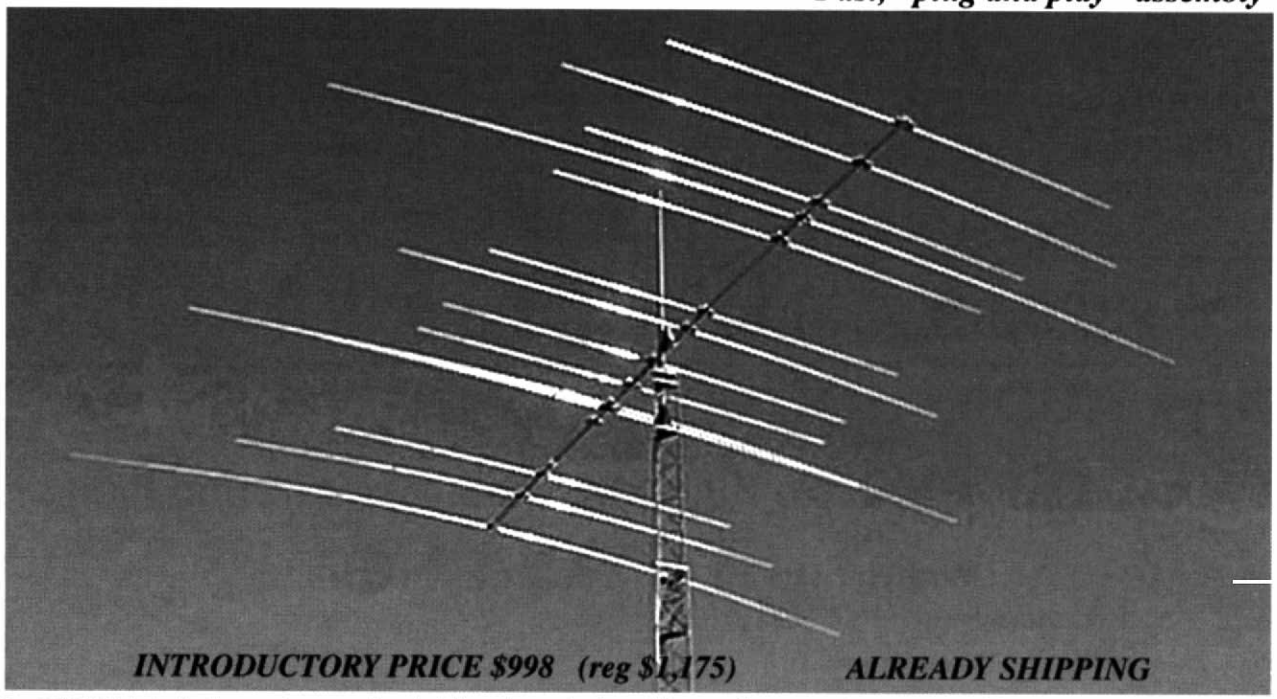
See our home page and hear the noise gate and equalizer in operation.

Prices include power supply and /30 day money back guarantee

C-31 XR

The Magnum Tribander that has no equal

> Based on our proven C-3, multi-monoband, no trap design
> Highest gain, superior patterns, stepped gain for stacking
> Wide-spaced 3el 20 & 4el 15, 7el on 10 mtrs, all full size
> Single feedline OR individual feedlines, your choice
> 5KW, 100 mph standard, 31' tapered boom
> Less than 100 in/lbs mast torque @ 70 mph
> 30" open space for side mounting
> Fast, "plug and play" assembly



The **C-31XR** is truly the next generation in tribanders: designed for maximum performance on 20-15-10 mtrs, plus strength, ease of assembly, low mast torque, side mounting and stacking. The **C-31XR** is 3 monoband Yagis overlaid on the same boom. There is a wide spaced 3el 20, a wide spaced 4el 15 and 7 elements for 10 mtrs. The gain target to beat was our own **C-3**, which was shown to have the most gain across 20 & 15 mtrs according to independent testing by K7LXC and N0AX. We did it! The **C-31XR** exceeds the **C-3** on 20, 15 and 10 mtrs. F/B and side nulls are exactly what you would expect: excellent. There is nothing better than the **C-31XR.**

C-31XR

31' boom, 14 elements, 85 lbs, 10.5 sqft, 100mph, 5KW, single feedline, no traps, all elements full size

Call or write for a comprehensive brochure on the **Force 12** product line. The brochure includes true specifications and explanations of terms. For the best $10.00 you will ever spend ($12.50 w/postage), ask for the book entitled, **ARRAY OF LIGHT (Straight talk about Antennas and Related Information)**. These 76 pages are a compilation of practical subjects, questions and answers, installation tips, operating helps and data on antenna design including a section on traps.

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Antennas and Towers

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ICOM IC-746

HF/6M/2M with IF-DSP and 100 Watts, Even On 2 Meters

SAVE $200 ON THE SPOT

see your ICOM dealer for details

Offer extended to 6/30/99

PC Remote Control
Windows™ software, RS-746, developed by ICOM

Pull out more signals. DX'ing? Even faint signals buried in noise can't hide from the '746's adjustable IF-DSP noise reduction. **Eliminate adjacent channel interference** with Twin Passband Tuning, 3 optional filter slots (front panel selectable), and a selectable DSP Audio Peak Filter (320/160/80 Hz). The '746's DSP Auto Notch eliminates multiple heterodyne signals.

One look at the large LCD display says it all. A glance "above the line" instantly lets you know all operating conditions and settings. Look "below the line" for menu selection, 5 soft key functions (which vary with the menu), passband width, and a band scope to search for signals.

***QST* bottom line:**
"An impressive transceiver for HF, 50 MHz and 144 MHz work. With loads of those features desirable to the serious HF operator *and* all modes at 100 W on both 6 and 2 meters, the IC-746 is a fine choice in a mid-priced rig."
– *QST*, September, 1998

SPECIFICATIONS

Transmit: ..... HF/6 Meter/2 Meter, 100% Duty Cycle
Receive: ..... 30 kHz-60 MHz, 108-174 MHz Quadruple conversion superheterodyne
Mode: ..... AM, FM, FM-N, SSB, CW, RTTY
Power: ..... 5-100 Watts (2-40W, AM)
Power Supply Requirement: ... 13.8 V DC
Memory Channels: ..... 102 total, 99 regular, 2 scan edges, and 1 call
Size: ..... 11.3(W) x 4.7(H) x 12.5(D) in. 287(W) x 120(H) x 316.5(D) mm.
Weight (approx.): ..... 19 lb, 10 oz / 8.9 kg

FEATURES

- **IF-DSP (15.625 kHz)**
  - Noise Reduction
  - Automatic Notch Filter
  - Selectable Audio Peak Filter
- **Twin Pass Band Tuning (PBT)**
- **Multi-Function LCD Display**
  - Band Scope, Memory Names, Key Assignments, PBT Settings, Split Frequency, Memory Keyer Contents
- **3 Optional Filter Slots**
  - 2 for 9 MHz, 1 for 455 kHz
  - All Front Panel Selectable
- **Digital, Multi-Function Metering**
  - Signal Strength, RF Output, SWR, and ALC levels
- **Auto Antenna Tuner**
- **RF Speech Compressor (not AF)**
- **Tone Squelch and Tone Scan**
- **Auto Repeater Duplex Setting for 2 Meters**
- **Quick Split Function**
- **Complete CW Functions**
  - 4 Ch. Memory Keyer
  - Electronic Keyer
  - CW Pitch Control
  - Full Break In (QSK)
- **VOX**
- **Voice Synthesizer (opt)**
- **Triple Band Stacking Register**
  - Remembers tuner selection, preamp, antenna, mode and frequency for last 3 frequency selections

Call Button
One touch recall of user programmed frequency and mode

RF Gain and Squelch
Programmable RF gain, squelch, or both

Continuously Adjustable Power Level
5-100 watts variable

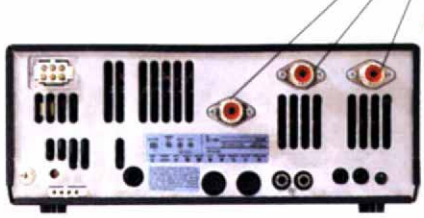
3 Antenna Connectors
Two for HF & 6M, and one for 2M

Digital Metering (on LCD)
Measures three parameters, all at once

SmarTune™
Automatically senses how fast you want to tune by how fast the knob is turned

Quick RIT/XIT Access
with zeroing function for today's crowded bands

Built in Auto Antenna Tuner
No external antenna tuner is required for HF and 6M operation.



ICOM Connect 2000

Get more out of your HF. Let the digitally-advanced '746 give you the edge, and still hand you the best of 6 & 2 meters. For a brochure, call **425-450-6088**

ICOM options required for PC operation:
CT-17 Level converter
RS-746 Windows™ Remote Control Software
OPC-478 Connection Cable

PC Ready!

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BIG THUNDER SERIES

Built to Perform, Built to Last

Multiband and Monoband Directional Antennas

Big Thunder rugged, high gain tribanders cover 10, 15, and 20 meters with 40 meter add on kits available. Cushcraft's four new monoband antennas cover 10 through 40 meters for the DXer who wants the ultimate in high performance and long service life.

High Performance

The superior electrical multiband antenna designs do not utilize traps in the high current driven elements and reflectors. The 4L log cell design technique yields maximum performance and power handling capability.

Reliability and Long Service Life

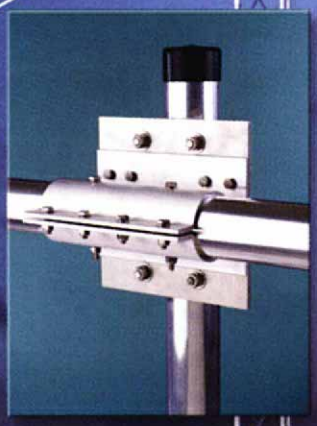
Each component has been chosen based on a threshold 1.25 times that needed to achieve a 100^{+} MPH wind survival rating.

SPECIFICATIONS

MODEL	XM240	XM520	XM515	XM510	X9	X7
Frequency, Meters	40	20	15	10	10/15/20/+40	10/15/20/+40
Number Elements	2	5	5	5	9	7
VSWR Typical Minimum	1.1:1	1.1:1	1.1:1	1.1:1	1.1:1	1.1:1
VSWR 1.5:1 Bandwidth, KHz	150	> 350	> 450	> 750	*	**
Power Rating, KW Output	1.5	1.5	1.5	1.5	2.0	2.0
3dB Beamwidth, Degrees	70	56	56	56	55/57/64	64
Side Lobe Attenuation, dB	>35	>40	>40	>40	>40	>40
Boom Length, feet (m)	22 (6.7)	35 (10.7)	24 (7.3)	19 (5.8)	28 (8.53)	18 (5.49)
Boom Diameter, inches (cm)	2.5 (6.35)	2.5 (6.35)	2.5 (6.35)	2.5 (6.35)	2.5 (6.35)	2.5 (6.35)
Longest Element, feet (m)	43 (13.1)	36.3 (11.1)	24 (7.3)	18 (5.5)	36.7 (11.2)	36.7 (11.2)
Turning Radius, feet (m)	24.3 (7.4)	25.9 (7.9)	16.3 (5.0)	13.0 (4.0)	21.7 (6.61)	20.0 (6.09)
Max Mast Size, inches (cm)	2.5 (6.35)	2.5 (6.35)	2.5 (6.35)	2.5 (6.35)	2.5 (6.35)	2.5 (6.35)
Wind Surface Area, sq ft (sq m)	5.5 (.51)	9.2 (.85)	4.5 (.41)	3.4 (.32)	9.9 (.92)	7.9 (.73)
Wind Load @ 80 mph, lbs (kg)	142 (64.4)	250 (113.4)	115 (52.3)	85 (38.5)	255 (116)	202 (92)
Weight, lbs (kg)	55 (25)	92 (41.8)	47 (21.1)	38 (17.2)	85 (38.5)	60 (27.2)

* X9 - (20M) 350, (15M) 450, (10M) 1500

** X7 - (20M) 600, (15M) 750, (10M) 1700



- **Maximum gain and ultra clean radiating pattern**
- **Rugged 100+ MPH construction.**
- **NEW 4L log cell multiband antenna driven elements for better VSWR bandwidth**
- **Super heavy duty mounting hardware**
- **40 meter add-on kits available for X7 and X9 tribanders**

A Lifetime of DXing Fun

These antenna designs truly reflect the needs of the modern DXer. Their electrical performance will never leave you wanting. Their mechanical integrity and ease of installation and maintenance is unsurpassed. The modular components used throughout the series are available as replacement parts that can be purchased direct from the factory. As such, these antennas may truly provide you a lifetime of DX fun and excitement.

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