NCJ

NATIONAL CONTEST JOURNAL

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July / August 2003

Volume 31 Number 4

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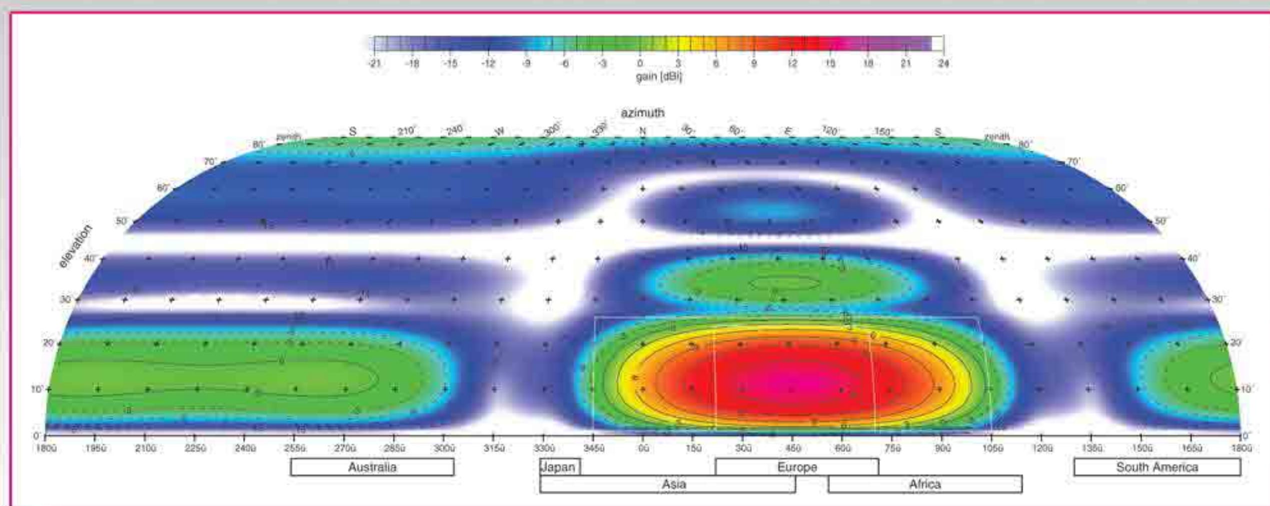
- How much is an S Unit?
- The Second Radio —Who's Using It?
- Phased Pennants
- CQ WW from The Gambia and Grand Cayman
- Results: February 2003 phone and CW Sprints; August 2002 NAQP SSB

Are you getting the most from your antenna system? **Eric Scace**, **K3NA**, has assembled new meta-tools for antenna pattern analysis. In the first of an informative series of articles, Eric applies these meta-tools to stacked Yagi systems as they are used in contests —with interesting results.



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225 Main Street, Newington, CT 06111
tel: 860-594-0200
fax: 860-594-0259 (24-hour direct line)
Electronic Mail: *hq@arrl.org*
World Wide Web: *www.arrl.org/*

Editor
Carl Luetzelschwab, K9LA
1227 Pion Rd, Fort Wayne, IN 46845
editor@ncjweb.com

NCJ WWW Page
Bruce Horn, WA7BNM, Webmaster
www.ncjweb.com

ARRL Officers
President: Jim Haynie, W5JBP
Executive Vice President:
David Sumner, K1ZZ

Contributing Editors
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Bruce Horn, WA7BNM—Contest Calendar

ARRL CAC Representative
Ned Stearns, AA7A
7038 E Aster Dr, Scottsdale, AZ 85254
aa7a@arrl.net

North American QSO Party, CW
Bob Selbrede, K6ZZ
6200 Natoma Ave, Mojave, CA 93501
cwnaqp@ncjweb.com

North American QSO Party, Phone
Bruce Horn, WA7BNM
4225 Farmdale Ave, Studio City, CA 91604
ssbnaqp@ncjweb.com

North American QSO Party, RTTY
Wayne Matlock, K7WM
Rt 2, Box 102, Cibola, AZ 85328
rttynaqp@ncjweb.com

North American Sprint, CW
Boring Amateur Radio Club
15125 Bartell Rd, Boring, OR 97009
cwsprint@ncjweb.com

North American Sprint, Phone
Jim Stevens, K4MA
6609 Vardon Ct, Fuquay-Varina, NC 27526
ssbsprint@ncjweb.com

North American Sprint, RTTY
Doug McDuff, W4OX
10380 SW 112th St, Miami, FL 33176
rttysprint@ncjweb.com

Advertising Information Contact:
Joe Bottiglieri, AA1GW, tel 860-594-0207;
fax 860-594-4285; *ads@arrl.org*

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Editorial

Carl Luetzelschwab, K9LA

Dayton

I certainly enjoyed seeing many of you at Dayton this year—walking around, at the ARRL booth, at the Contest Dinner, and in the hospitality suites Friday night. Tom, K8CX, has already posted many pictures from this year at **hamgallery.com/dayton2003/**.

Doug, K1DG, penned a summary of the Contest Forum for this issue. If you missed Dayton, this article will let you know what happened. And *NCJ* congratulates the new CQ Contest Hall of Fame inductees.

One of the highlights for me was attending the Youth Forum. On Friday Jack, W1WEF, mentioned that he had a blast going to last year's Youth Forum. So I went, and it warmed my heart to see enthusiastic youth getting into ham radio—especially those getting into contesting.

And speaking of the Youth Forum, congratulations to Tree, N6TR, for being the Hamvention's Amateur of the Year for creating, organizing and promoting the successful "Kids' Day," now administered by the ARRL.

Visalia

Ward, N0AX and Bob, N6TV, check in with articles about the contest activities at this year's International DX Convention. Ward's article analyzes SO2R to see if it should be a separate category, and Bob describes the discussions at the Contest Forum.

In Memoriam

Bruce, WA7BNM, suggested that *NCJ* start an In Memoriam section of the *NCJ* Web site to honor contesters who have become Silent Keys. I agreed that this is an excellent idea. The first SK on the *NCJ* Web site is Ed Bissell, W3AU (ex-W3MSK). Bruce collected comments from many noted contesters, and posted them (with permission) to the W3AU In Memoriam page.

I'd like a volunteer to become the focal point for all future In Memoriam efforts. The job would involve receiving notices of SK contesters, collecting comments from others via personal communications and reflectors, obtaining permission to use the material, putting together the "package" in plain text (.txt) format, and forwarding it to the *NCJ* Webmaster. If you are interested, please send me an e-mail.

QRM

As Cycle 23 winds down and 10m and 15m propagation goes away, our spectrum will get increasingly crowded – with contesters and non-contesters competing for precious bandwidth. Check out the hypothetical exchange between a contester and a non-contester in this issue. From that and recent reflector comments, I put together some contesting rules of etiquette. By adhering to these, maybe we can head off some problems at the pass. I'd love to hear your thoughts on this.

K8CX Photo

Tree, N6TR, (left) with "Red" Stillman, W6AE. Tree was named Hamvention's Amateur of the Year for creating, organizing and promoting the successful "Kids' Day."

NCJ Index

Thanks to Terry, N4TZ, the *NCJ* Index is now up to date through 2002. It's on the ARRL Web site, and you can link to it through the *NCJ* Web site by clicking on **INDEX** at the top of the home page (**www.ncjweb.com**). Also thanks to Tom, KC1J, at HQ for his efforts in this.

Errata

In the March/April issue, Rudy, N6LF, had an article titled "Single Support Gain Antennas for 80 and 160 Meters." Note 7 at the end of his article referenced another article by Rudy that was to appear in the *ARRL Antenna Compendium Volume 7*. Unfortunately, Volume 7 had too many articles when it went to the printer, and Rudy's article got cut. Hopefully it will be in *Antenna Compendium Volume 8*. Thanks to N4OO for asking about this.

Adventures in Contesting

The Adventures in Contesting picture on page 45 of the May/June issue was a photo of me. So, now you know what I look like. Who are the other two K9s in the photo? Heidi, the Miniature Schnauzer, is ours. Zach, the Siberian Husky, belongs to our younger son's fiancée (we took care of Zach for several months).

Any other interesting photos out there? Send them in with suggested captions (keep it clean!), and we'll run them. I think it's always good to take a humorous look at ourselves.

NCJ Articles

I'm always looking for contest-related articles, so please contact me if you have an idea for an article. Topics can range from technical features to contest operation narratives to general interest stories. I'd love to have you share your article with the *NCJ* readership. NCJ

How Much Is an S Unit?

By Jürgen A. Weigl, OE5CWL

(The complete, unedited version of this article, including details of the statistical methodology, appears on the NCJ Web site at **www.ncjweb.com/**—*Ed*)

Have you ever wondered what the difference is between the vertical antenna at your station and the tribander at the station of your friend around the corner? Or, are you going to operate the next contest as a guest operator and would like to know how competitive this station will be? Analyzing the logbook with statistical methods may be one way to find the answer to some of your questions.

Although statistical methods are used today in many fields, I do not recall any publication in the Amateur Radio literature how these methods can be successfully used by hams. I first used statistical methods some years ago, when trying to find out how a new 40-meter antenna performed compared to the old one (which was already removed). Since then, a lot of time was spent to find out how statistics could be used by amateurs to ensure reasonable results.

Signal Reports

When you are in contact with a new station, especially if you are chasing DX, you are always anxious to know how strong your signal is. For this purpose, we amateurs use the S in the RST report (readability, strength, tone). For this analysis, we will ignore the R and T.

The S value varies between S1 and S9 plus. The value for S that you receive is usually an unscientific subjective rating. You have to remember that your signal will simply be rated in this fashion most of the time, not actually measured. It is important for our investigation to consider the S unit not purely as a technical value. This is necessary for several reasons:

- Even in our modern transceivers, the S meters are not very accurate. The S-meter reading can be far off the real value. There also can be some variance when changing bands.
- Many amateurs just estimate the signal strength by ear, with S units corresponding to definitions like the ones given in Table 1.
- The report will be psychologically influenced and a rare station may be more likely to receive an S9

Therefore, we have to consider the S report as a signal rating, influenced by many factors not under our control. Nevertheless, we will see that when using a sufficiently large sample, we can minimize these effects and get reasonable results.

For our investigation all statements will refer to S units as commonly used by amateurs (see Table 1). We will not speak of a specific voltage at the receiving point. We will treat S unit reports more like an opinion poll, similar to the question, "How much does the other station like my signal?"

When analyzing data, there is one point we have to keep in mind. Although a contest would be the best situation to make such an analysis (since we work thousands of other stations within a very short period of time) we cannot use contest reports for our study. The reason is obvious: the exchanged report is, in almost all cases, 59, making the report by itself meaningless. Therefore, we must use everyday QSOs outside of any contest for our investigation.

Statistical Treatment of Signal Reports

We will start with an examination of the typical distribution of signal reports. I have been the chief operator of an Austrian club station and have access to a great amount of QSO data. Let's first look at the reports on 20 meters working Europe.

When investigating data like this, it is essential to minimize any influence that could introduce possible errors in our evaluation. What are the possible influences for our example? One influence is the output power and the antenna used on the transmitting side. We can control this by doing our investigation only for contacts with the same power level and the same antenna. In our example, all contacts were made with an output power of 100 W and the antenna was a simple trap vertical (14AVQ from HyGain) about 35 meters above ground.

A second influence comes from the distance over which we make the contact. It's obvious that our signal will be different when working DX or contacts on our own continent. In our example, we try to control this influence by limiting our investigated contacts only to contacts with other European stations.

A third influence comes from the band conditions: while conditions in general terms vary within the period of a solar cycle, they also vary on a daily basis. To control this, we only consider contacts within a similar period of solar activity described by the relative and smoothed number of sunspots. We will not try to control the daily variation of the ionosphere, but with a big enough sample, this will be minimized.

A fourth influence is the receiver, the operator and the antenna (gain) at the

Table 1
Definitions for S Units

S Unit	*Definition*
1	faint signals, barely perceptible
2	very weak signals
3	weak signals
4	fair signals
5	fairly good signals
6	good signals
7	moderately strong signals
8	strong signals
9	extremely strong signals

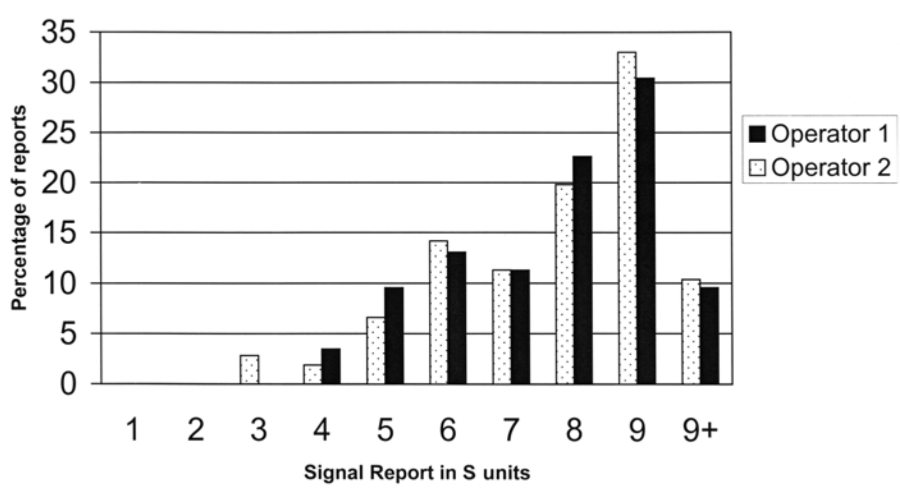


Figure 1—Percentage of signal reports for club station OE6XRG on 20 meters to Europe.

Table 2

Signal Reports for Austrian Club Station OE6XRG for Contacts on 20 Meters with Europe. Two Different Operators are Analyzed During the Same Time Period.

S Report	*9+*	*9*	*8*	*7*	*6*	*5*	*4*	*3*	*2*	*1*	*Total*
Op 1											
No. Of Reports	11	35	26	13	15	11	4	0	0	0	115
Percentage	9.57	30.43	22.61	11.30	13.04	9.57	3.48	0	0	0	100
CDF		9.57	40	62.61	73.91	86.96	96.52	100	100	100	100
Op 2											
No. Of Reports	11	35	21	12	15	7	2	3	0	0	106
Percentage	10.38	33.02	19.81	11.32	14.15	6.60	1.89	2.83	0	0	100
CDF		10.38	43.40	63.21	74.53	88.68	95.28	97.17	100	100	100

other end of the QSO. We will assume that when we use a big enough sample we will get a representative profile of possible stations within our target area.

I searched the log of the club station within a period of one year for 20 meter-contacts with European stations. Two different operators made these contacts. Operator 1 (Op 1) made 115 contacts and Operator 2 (Op 2) had 106 contacts. To avoid any possible influence from the operator himself, I investigated each operator separately. Table 2 shows the number of reports for each S unit and each operator.

With this list, we are now able to compute the average signal report. This is done by multiplying the number of reports from each category by its value, adding the totals, and then dividing by the total number of contacts.

The value of each category is the corresponding S value. But we have a minor problem: what is the value of a report 20 dB over S9? For now, we'll simply put all reports of over S9 into the category 9+ and assign a value of 10 to them.

Computing the average signal report for both operators in our example brings an average report of 7.696 for Op 1 and 7.726 for Op 2. Although there were two different operators working completely different stations within Europe and operating at completely different times and days within the same time, the average signal report for them differs by only 0.03 S units!

There is another way to treat the received reports that will give us even more information about our signals—the cumulative distribution function (CDF). We start by calculating the percentage of signal reports for each category. For example, Op 1 had 35 S9 reports for his 115 contacts, so there are 30.44 % S9 reports. This is done for all other reports and Op 2. The results are shown in the "percentage" rows of Table 2 and in Figure 1.

Next, we calculate the cumulative distribution-function (CDF). For example, for Op 1 the S9-plus percentage is 9.57% and the S9 percentage is 30.43%. Therefore, the cumulative distribution for 9+ is 9.57% and for S9 is 40.00% (30.43 + 9.57). This means that 40% of the reports are S9 or better. Figure 2 shows these results graphically.

This distribution is typical for most of the cases I have analyzed, although the curve may be moved more to the left side or more to the right side of the diagram. Please note that the value at 50% is not identical to the average signal report!

Figure 2 clearly indicates how close the results are for both operators. While taking one single report or even a handful of

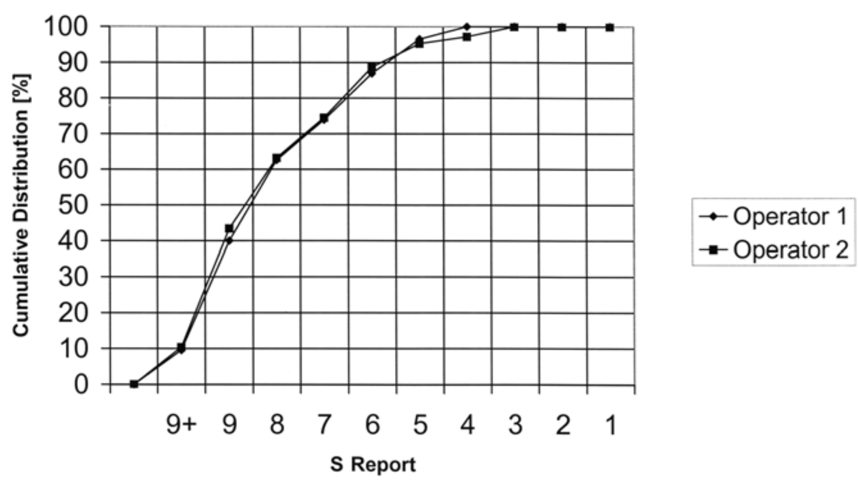


Figure 2—Cumulative distribution function for club station OE6XRG on 20 meters to Europe.

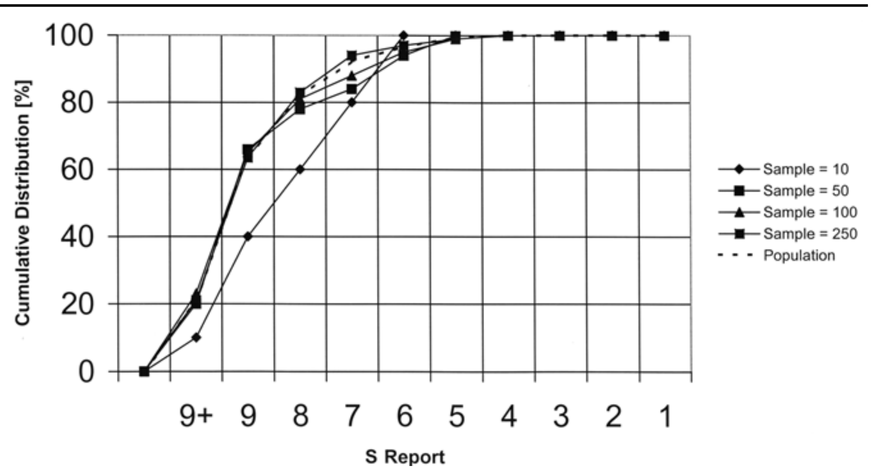


Figure 3—Cumulative distribution function for different sample sizes.

reports does not really give you much information about the performance of your station, doing an analysis as was done here with a reasonable sample size will give you some interesting results. From the curve in Figure 2 (or from the data in Table 2), we see that this contest station working Europe on 20 meters will get an S9 or better signal report in 40% of the cases. We will get an S8 or better report in about 60% of the cases. We can also put it in other words: the probability to be rated S9 or better by another European station is only 40%.

That last sentence does not seem to be very attractive. I have participated in some contests from this club station and found that it was not very competitive. But what else would you expect from 100 W into a multiband vertical, even with it high up in the sky?

It is important to note that the same thing happened in the cumulative distribution function as what happened in the average signal report. The difference between both operators working Europe on 20 meters, even though they worked different stations at different times, is insignificant. From this we can conclude that we end up with very reasonable results by analyzing a bit more than 100 contacts.

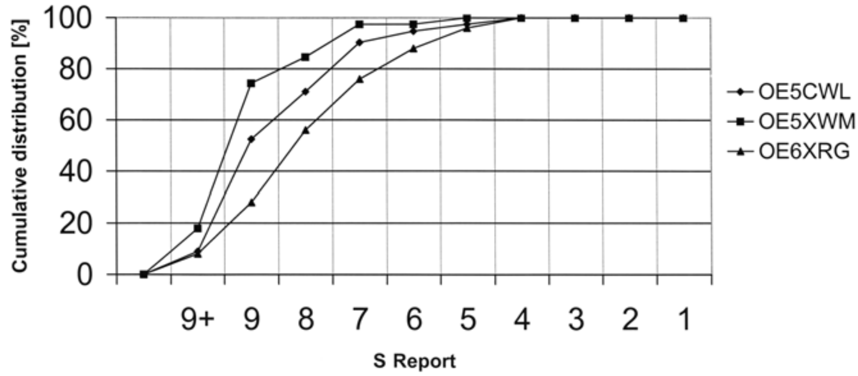


Figure 4—Cumulative distribution functions for three different stations working North America:
OE5CWL: 100 W to a 3-element tribander at a height of 17 meters
OE5XWM: 400 W to 3-element tribander at a height of 15 meters
OE6XRG: 100 W to multiband trap vertical at a height of 35 meters

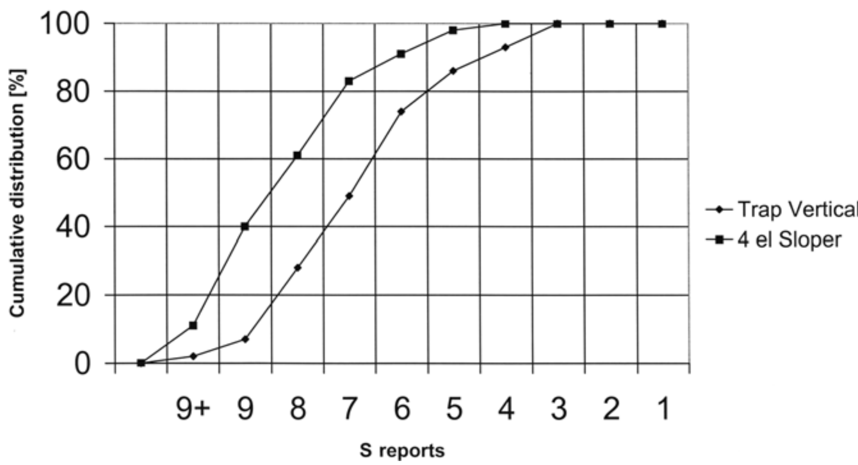


Figure 5—Cumulative distribution functions for two different antennas at OE5CWL with 40-meter DX QSOs.

Sample Size

Before we continue with some examples showing how to use the CDF for comparing different stations or different equipment, let's take a quick look at how the results may differ if we use different sample sizes.

A sample is defined in statistics as a subclass of a population. In our case, the population was all possible contacts with European stations on 20 meters, whereas the sample of this population was all contacts Op 1 or Op 2 made during the observed time. As we have seen from our samples of 115 contacts from Op 1 and 106 contacts from Op 2, the results are very close. This suggests that these samples were big enough.

A sample can range from one contact to any amount of possible contacts. It's obvious that with one contact we cannot get any realistic statistical inference. As the number of contacts considered is increased, we become more certain of the results. To show this effect, we'll look at the results of another example: we have worked 500 European stations on 80 meters. We consider these 500 European stations to be our population and we calculate the signal report cumulative distribution function.

Figure 3 is the result of this, and it shows that with increasing sample size, we get closer to reality. You can see that the results get very accurate when you have a sample big enough.

Taking a sample size of 100 contacts gives us a high confidence. With a small sample size of only 10 contacts, you will see the trend, even though the result by itself will not yet be very accurate.

Early on, we said that we are treating S-meter reports not so much as a technical value, but as some kind of opinion poll. It is interesting to digress and look at the sample size in an opinion poll. I don't know the values for opinion polls in the US, but here in Austria we have a population of about 8 million people, of which about 5 million are adults. The typical size of a sample in our opinion polls is between 500 and 2000 persons. That is only 0.01 to 0.04 percent of the population! This figure is about two orders of magnitude less than our example of 10 samples out of a population of 500.

Some Words of Caution

Before showing some examples for practical applications, some words of caution are in order. When we use the signal report for investigation, we are always evaluating the entire communication system. That includes the equipment and the antenna, as well as the operator at the station or the propagation conditions. So you have to make sure that the only thing that changes in the whole system is the parameter that you're evaluating.

For example, if you add an amplifier to your station and would like to find out how your signal improved, you should gather reports on a specific band with a specific target area and within a period without dramatic changes in band conditions. Comparing results of contacts at solar minimum with that at solar maximum will be interesting, but it will not bring you reasonable information on how the amplifier performs.

Also, your target area, which we call the population, should be clearly defined right at the start of the evaluation. You might only take into account contacts within a 500-mile distance, or limit it to all DX contacts, or only to Russian stations, etc. Of course, the sample should be as big as possible.

Now let's look at some applications of our statistical method.

Some Examples

Using this method, we can easily find out how different stations perform. While I was chief operator at OE6XRG, I also owned a more competitive station together with my brother, OE5CUL. The setup at this joint station was 100 W output into a triband Yagi, which had 3 working elements on 20 meters and 5 elements on 15 and 10 meters. This antenna was about 17 meters high.

Unfortunately, we don't have this station anymore, and I now usually operate from another club station (OE5XWM), but using my own call sign (OE5CWL/5). This station has a three-element tribander about 15 meters high and an output of 400 W (which is the legal limit in Austria for individual stations).

Now it may be interesting to see how these stations compare. Figure 4 shows the cumulative distribution of signal reports for all three stations for 20 meters working North America. The contacts for this analysis were not within the same time, but I made sure that the analyzed time periods had similar sunspot activity.

Looking at Figure 4, let's first compare the two stations with the same power level: OE6XRG and OE5CWL. The average signal report differed by 0.887 S units in favor of the Yagi at OE5CWL. At the 50% level, which I suggest you use as a standard (but remember this is not the same as the average signal report), the difference is about one S unit. While it was possible to keep a frequency and work stations by calling CQ in contests at OE5CWL, this was not possible at the OE6XRG location. At OE6XRG, only search-and-pounce techniques produced a reasonable rate.

Another interpretation of the results makes this clear. As Figure 4 indicates, the probability to receive a report S9 or better in North America is twice as high with the Yagi at OE5CWL than with the vertical at OE6XRG. I think this is a very important conclusion for contesting. Although the difference between both stations is only roughly one S unit, the chance to have a good signal in North America has doubled! Keep this in mind when optimizing your contest station. There is a part of the CDF that is rather steep, and with every improvement you will move the CDF more to the left. In this steep part of the curve, you get a dramatic improvement, while it will not make too much difference at the flat upper and lower end of the curve.

Now lets look at the results of the third station: OE5XWM. The Yagi at OE5XWM is not the same type as at OE5CWL. The latter one is three elements on 20 meters with a boom length of 7.5 meters, and is a bit higher than the Yagi at OE5XWM that uses a boom length of 5 meters. I think that this Yagi is inferior to the Yagi used at OE5CWL, but the higher output at OE5XWM is clearly indicated by the cumulative distribution function. The probability for a S9 or better signal in North America is now about 75%, which means an improvement of about 50% compared to the signal of OE5CWL, which has a probability of about 50%. Compared to OE6XRG, the probability for a S9 or better signal is now almost three times higher!

With this method you can not only compare different stations, but you can also find out the result of improvements. As a matter of fact, I developed this method when I tried to find out how two antennas compared. Some time ago, our 40-meter antenna was changed. We removed the old 14AVQ trap vertical and built a 4-element sloping dipole array. The vertical was mounted on a flat metal roof. So, it had a very good counterpoise and we had real good success with it working DX on 40.

Nevertheless, a directive antenna was always in our mind. We eventually constructed the 4-element sloper system similar to the one described in reference 2. It used shortened dipoles, and with a switching system, one element was chosen as the driven element while the remaining elements worked as reflectors. This antenna really showed excellent results. Unfortunately, it was impossible to compare both antennas on the air at the same time as the vertical had to be removed to make room for the sloper. Therefore, we analyzed all 40-meter DX contacts within one year (before and after changing the antenna).

Figure 5 shows the results, and this really confirms the improvement with the new antenna. The difference of both antennas at the 50% mark is about 1.6 S units, and the average signal is about 1.4 S units better. But again, what is much more important can be found at the S9-mark. The probability for an S9 or better report is now five times higher! I believe this observation is of more importance than the difference in the average report.

What really counts for the DXer or contester is to improve the probability of breaking through a pile-up. It's obvious that the increased probability for a strong signal in DX, now being five times higher, is worth much more than the average improvement that is a bit more than one S unit. From this point of view, you can understand why any improvement, even less than the usual 3 dB, is so important when working DX or participating in contests. Every fraction of a dB will move the CDF to the left and therefore increase the probability for you to be heard.

Wrap Up

Of course, there are more applications for our statistical method. Besides comparing different station or antennas, you may evaluate how your signal improved with that new amplifier. Or, you may even try to find out the improvement from your speech processor, where it's difficult (if not impossible) to give any dB figure.

I hope that the described statistical method will be useful for many amateurs, and I would appreciate any comments or criticism. You can e-mail me at **weigl+info@magnet.at**.

References

[1]"The R-S-T System," *The Radio Amateur's Handbook*, Chapter 24, Operating a Station, p 647, ARRL, Newington, CT, 1976

[2]"7 MHz Sloper System," *The ARRL Antenna Book*, 18th Edition, Chapter 6, "Low-Frequency Antennas", p 6-30, ARRL, Newington, CT, 1997

A Mast-Raising System

By Robin Midgett, KB4IDC

Here's a description of an apparatus I built and used to raise my mast inside the tower top while installing antennas.

I developed it because I discourage the use of a bolt through the mast with or without a sleeve for backing up a thrust bearing. As was pointed out very quickly by an astute "TowerTalk" subscriber, the method suggested in "Hints & Kinks" (An Antenna Thrust Backup, *QST*, January 2002, page 67) weakens the mast near the most critical point in the system. The method of horizontal bolts biting into the vertical mast to support the weight of the antenna system (used by most thrust bearing manufacturers) does not appeal to me.

A much safer and easier solution is to use a commonly available shaft collar. Shaft collars are available in two basic configurations; as a solid ring with a single set screw or as a ring split in half with a pair of bolts that pull the ring halves together like a clamp. I chose the split version for my tower system, as this type does not mar the mast when tightened. In addition to transferring the weight of the antenna system to the tower without marring or weakening the mast, the shaft collar makes raising the mast incrementally easier by allowing the installer to tighten the shaft collar at any point along the mast.

My array has several VHF and UHF antennas at different heights on the mast, so being able to raise the mast a few feet at a time and have the mast safely held in place while installing the next antenna is a benefit. Shaft collars are available in various inside diameters, usually in 1/16-inch increments, and possibly in metric units as well. Industrial supply houses such as W.W. Grainger, MSC Direct and McMaster-Carr stock shaft collars in various metals such as cold rolled steel, aluminum and stainless steel. Prices for a 2-inch ID shaft collar are well under $20.

On the subject of raising the mast, I found that raising a 2-inch OD 18-foot 6-inch 4130 Chromoly mast to be a laborious task, especially at a tower top height of 130 feet. Adding antennas and feed lines only multiplies the difficulty due to weight and balance issues. My solution was to use a combination worm drive winch and a pulley and yoke assembly.

Description

The worm drive winch is fastened to the tower top with U-bolts and a steel bracket that I built. The winch is threaded with a 50-foot length of flexible steel cable with a hook at its end. The pulley is an 8-inch steel cable pulley that I "liberated" from my employers trashcan. I built a steel yoke to support the pulley and attach the pulley to the mast. With the mast lowered inside the tower and hanging by the shaft-collar-thrust bearing combination, the yoke and pulley assembly is attached to the bottom of the mast. The cable from the winch mounted above is passed down the inside the tower through the pulley and back to the tower top on the opposite side of the tower from the winch where it is fastened—where it hooks to a tower rung.

A view down the inside of the tower showing the mast, the pulley at the bottom of the mast, and the cable.

The collar and thrust bearing on the top of the tower.

The T-bar just below the thrust bearing.

The winch and the frame to which it's mounted.

The slack is taken up in the cable by the winch. At this point, the winch, cable and hook form a "V" in which the mast is cradled in a double purchase mechanical arrangement. The worm drive winch allows one person to raise and lower the mast easily with smooth operation and the mast doesn't give way to gravity when the winch is unattended. Don't forget to loosen and adjust the position of the shaft collar as the mast is raised or you will be wondering how to retrieve it later.

When all the antennas and feed lines are installed on the mast and the mast is raised to its final height, position the shaft collar appropriately on the mast. Meanwhile, the mast is held in place laterally by another bracket below the thrust bearing but above the rotator point while the rotator is installed. Once the rotator is installed, the bracket (T-bar as I call it) is removed and the rotator counteracts the lateral loads. While time is consumed on the setup and installation of the winch, it makes a two-person job easier for one person to perform. See the pictures of the system in operation.

I can supply drawings for fabricating the winch bracket, the pulley yoke and the T-bar. You can contact me at **robin.midgett@vanderbilt.edu**. NCJ

Team ZF1A: 5 Years Later

By Mike Krzystyniak, K9MK/ZF2MK

In 1997, I was a member of the ZF1A team on Grand Cayman Island that took first place World in the Multi-single category of CQWW-CW (the team consisted of Dan K1TO, Joe W5ASP, Carl K9LA, and Mike K9MK—*Ed*). That accomplishment will always stand out as one of the most memorable experiences of my amateur tenure. Five years later I bumped into K9LA and W5ASP at Dayton. Joe was putting the ZF1A band back together for the 2002 CW event and still needed a sixth operator. I thought about it, but wasn't sure I could make it. Then, two months later at HamCom in Dallas, I bumped into Joe and Carl again. The timing was right so I signed up. This is my perspective of our 2002 story with some contrast to what I recall of the 1997 ZF1A effort.

There were two more invitations open but they eventually declined so we decided to go with a crew size of six. Team captain was Joe, W5ASP (ZF2TR). Team technical lead and de-facto co-captain was John, K6AM (ZF2AM). The third ZF veteran was Dan, N9XX (ZF2RR). The two new ZF1A team members were veteran contesters Blake, N4GI and Dale, KG5U.

In August, we started to exchange e-mails on strategy and who would bring what hardware in support of the effort. This year was unique in that CQWW had added a Multi-2 category so the team had to decide which category to enter. John, K6AM, put together a thorough proposal for a station design that could be used in Multi-single or Multi-2. With time to study the station design and some new (to me) operating concepts, the team met for several schedules in the weeks prior to departure. Although there was no single advocate, the lack of team experience in the Multi-2 arena made Multi-single more attractive for our endeavor.

The Station Design

Our station logistic situation is fortuitous for us in that a large part of the station infrastructure located at the home of Andrew Eden, ZF1EJ. We just needed to fill in four station positions with hardware, plumbing, fix antennas, computers and make things bulletproof to accidents.

The shack is roughly 15-feet square with two sets of desks side-by-side. What we called the front row of desks was home to the main run station and the in-band multiplier station. At the core was a Yaesu FT-1000 Mark 5 transceiver, which was configured to support a companion or second position. The Mark 5 drove an older model Alpha amplifier. To the right of the run station the in-band multiplier station, or Mult-1, used a Kenwood TS-850 transceiver. In the back row were two more TS-850s on Mult-2 and Mult-3. The amplifier compliment for Mult-2 was an Ameritron AL-80. Mult-3 drove a Collins 30L1. Using Dunestar and ICE bandpass filters minimized front-end overload. Antenna selection and collision prevention was managed by several custom switches and used Array Solutions Six Packs and a Stack Match.

Antenna Work is *Always* Needed

Even though the station is located about half mile from the ocean, it still suffers from the perennial onslaught of the elements. Sometimes this is in the form of a tropical storm or hurricane, and sometimes from the day-to-day salt spray that seems to permeate anything man can build, including antennas. From 1997, we still had the TH7 at 90 feet and the KLM rotary dipole at 80 feet. The Cushcraft 2-element 40 meter and the Pro-77 antennas were still intact. The 80 and 160-meter inverted Vs were trash and the old reliable TA33 was replaced with a C3. We needed to refurbish the TH7 and KLM 80M1 and we needed more low-band performance options within the physical constraints of the antennas supports on site.

Within 3 weeks of the contest start, John had published for comment the station plan and who would be bring which portions of the station. Inevitably in these endeavors, some were heavily loaded in transit while others were just loaded. Due to a recent job change I was going to be the last to arrive, which made me the insurance guy. Part of my job was to grab any last minute items that might be needed. As everyone packed out, it was obvious that I had little to carry. In the end, we elected to upgrade the feed line to the main TH7 antenna from RG-8 to Heliax. I didn't know that 278 feet of Heliax with connectors weighs 68 pounds when tightly coiled in my biggest suitcase. Changing from coax to Heliax on the TH7 was worth greater than 3 dB!

Dan, N9XX, was the first one out. Leaving from Milwaukee, he arrived at Grand Cayman later that Sunday (November 17) to fantastic 80-degree weather. Everything was fine, except for the rain. Dan's charter was the TH7. Even though Dan was thoroughly prepared for the rebuild, he had his hands

Serious TH7 bracket corrosion and insulator rot.

John, Dale and Blake repairing loading on KLM 80M1.

Blake running coax to refurbished TH7 and KLM 80M1.

full of antenna reality about 3 seconds after the first antenna hit the ground. On the TH7 we had corrosion of the aluminum plates and screws, bolts rusting into dust and plastics crumbling at the mere touch. On the KLM 80M1 linear loading wires disintegrated and busted feed wires were the obvious. The fun stuff was what you couldn't see. Dan dug his heels in and went after it like there was no tomorrow.

Between the raindrops, Dan worked feverishly to tear apart the antennas piece by piece and rebuild them. The weather was not cooperating. An unusual weather pattern developed and a front stalled just east of the islands. It was really raining.

The second wave arrived Tuesday (November 19). With the arrival of John, Joe, Dale and Blake came the bulk of the station and hardware. Cars full of Pelican cases and backpacks rolled up to the shack and started to unload. Joe, W5ASP, arranged to pick up some of the equipment that was stored on the island. Note that over the years, several of the guys that frequent the Caymans opted to buy "shares" of the equipment that is on the island permanently. Several of the transceivers and amps fell into that category, making the logistics of this highly integrated station possible. For the next 72 hours, the small hurricane-resistant building that we all call the shack was bustling with assembly activity.

By Wednesday, Dan, N9XX, had completed refurbishing the TH7 and it was returned to the SSV tower. With these antennas back in place, it was time to put up the new 80 and 160-meter antennas. But just then, it started raining again. So, Blake and crew focused on getting the FT1000 Mark 5 integrated and working.

They set up schedules each night to get me a list of what was needed. For three nights prior to my departure all was quiet on 14330 kHz. The phone didn't ring, either, so I assumed all was in order and I packed myself.

I left the Dallas area around 1300 UTC on Thursday and arrived on Grand Cayman at 1900 UTC. The flight from Miami to Grand Cayman was one of the most turbulent I had ever experienced, which drove my concerns about the weather now being a factor at ZF1A. I did my best to clear Customs and get out to the shack as quickly as possible. Upon my arrival at the shack, the team was inside working on the station arrangements and testing rigs. It was still raining. Outside, the TH7 was up and John had the KLM 80M1 ready to go. The guys have been cranking it hard and they looked it when I walked in.

It Never Goes According to Plan

After some brief introductions and a status review, we got back to work. Two of the TS-850s were damaged and had some operational issues. I helped John carve out a useless audio mute circuit on one of them while the other seemed to be deaf. Further investigation led us to a bad CW filter. We had the same thing happen in 1997 when the CW filter board sheared in transit due to drop shock. Later John replaced the front-end transistor, which brought the last radio back to life.

L-R: Joe, W5ASP; Dale, KG5U; Mike, K9MK; Blake, N4GI; Dan, N9XX and John, K6AM.

Team ZF2MK: Becca, Miki, Zak, Kati and Mike

Our host Andrew Eden, ZF1EJ.

It was now 8 PM local time and we were just inside of T-minus 24 hours. We still had to finish wiring the stations, hook up the Internet and *CT* computers, raise the 80-meter phased array and the 160-meter inverted L and then hook up the rotors and coax. I thought we had plenty of time. Wouldn't you?

The guys agreed that they needed a break, so we went to the local watering hole. It's a pseudo sports bar called "Durty Reed's" where you can get a great burger and iced tea if you want it. After chowing down, we headed back out to the shack to take care of as much as possible. It was still raining. Several of us pulled the plug around 2 AM and went back to the barracks for a nap.

Finishing Touches

At sunrise, we were back at it. Lots to do before we sleep. The best I can describe, it was organized chaos. Andrew had graciously arranged for the local tower service to help us and the guy was due to arrive around 10 AM. We needed to get the KLM 80M1, rotors and coaxes up the big tower before the rain started.

Blake was our tower man. On the ground, everyone was pushing to get the tasks completed. Some of us had to be in 2 or 3 places simultaneously, which led to minor frustration. Despite an occasional disagreement, things were coming together. But wait, we just hooked up the Heliax to the TH7 and the SWR was infinite. Bad feed line, bad balun or was it worse? After an hour of analyzing the problem, Blake found a loose bolt on the balun lead. Once fixed, the TH7 SWR was perfect in all three CW bands. The KLM 80M1 went up next and was quickly cabled. The SWR was flat, too, and with its new Orion rotor, it looked great (on average the 80M1 would chew up a TTX rotor at least once per year).

Shortly after 2 PM we started to string up the phased 80-meter verticals. The basic configuration was taken from a W7EL design that integrates the phasing into the feed line system (see *ARRL Antenna Compendium, Vol 2*, page 25). Our system was a simple variant that added an extra cat line to support a third radiator that allowed our manual changing of the phasing feedline to either NE or NW. Another two runs up the tower for Blake. Within a couple hours Joe and Dale had them playing perfectly. Did I say it was raining? Oh, wait…the 160-meter inverted-L is tangled in the tower. Say Blake, one more time, buddy. You can do it! And he did. For 160 meter we chose a simple inverted L based on some success in previous contests.

To improve reception on 160 and 80 meters, we planned to put up two Beverages. The Beverage antennas were staged where we could put the 700 and 1000-foot runs up without risk of getting into the Maiden Plum (we brought Tyvek suits just in case). Read our 1997 story (in the November/December 1998 issue of *NCJ— Ed*) to learn more about Maiden Plum. The rain didn't help either.

It's now 2300 UTC Friday and all the antennas are ready to go. Inside John, Dan and Dale finished wiring up, testing and certifying that each station was ready to go. Dan had the *CT* network all set up and we were logged into several DX clusters. Joe and I were outside with Blake making the final tweaks to the low band antennas. It was Miller time—*not!*

The Contest

Thirty years ago, I was introduced to contesting by some serious contesters that proved influential in my appreciation for what differentiates a good start from a contending start. It's rate, rate, rate. Our team set a goal of 7500 Qs, 175 zones and 575 countries for a target score of 14 million points, which would break our ZF1A record of 1997. Dan, N9XX and John, K6AM, opened on the companion run station while Dale, KG5U, manned Mult-1. Joe, W5ASP and I were in the back seats on Mult-2 and Mult-3. As in 1997, we opened up on 40 meters with the intent to maximize 3-point QSOs into Europe, but we had a hard time getting a foothold on a frequency. The upside was that Joe and I quickly developed an effective tag team rhythm for Mult-2 and Mult-3. The companion position was starting to click and the mult stations were going back and forth as the 10-minute rule and opportunity permitted.

A few hours into the contest, we noticed a problem developing on Mult-3 with the Dunestar BPF, or maybe its controller. It might have been some RFI, but the consequence was a dead receiver on Mult-3. John quickly switched seats and went to work repairing the dead radio while the run station started to pick up the pace.

Saturday morning the higher bands opened early with 20 meters going strong some 2 hours before sunrise, with 15 and 10 meters right behind. After sampling each band we settled in on 15 meters, as for us 10 meters never really sounded strong enough to make rate. Nonetheless, we bounced between the bands every 45 minutes or so, making sure we scrubbed the alternate bands for mults. The mid-day rates soared to 200-250 QSOs per hour for nearly 7 hours straight. Talk about a rush!

Local connectivity to the Internet and the spot-sucker interface to *CT* were keeping us busy with mults popping up all over. Dan, N9XX, used an Ethernet network connected to the six laptops. The Ethernet network linked to a wireless LAN that linked to the DSL service cable and wireless to our host ZF1EJ. Using a Telnet-like program, Dan, N9XX, had us set up into four clusters on four separate continents. A spot-filtering program eliminated duplicate spots.

Twenty-four hours into the contest we were matching our 1997 score, but the pace needed to break the 1997 ZF1A record was falling behind. The QSOs were slightly off (our slow start), but that was offset by an increase in mults. As we headed into the second night things slowed. Mults were harder to find and rates on the run station fell below 100/hr three times. We did everything possible to hit every band and make all the noise we could. Approaching sunrise, things started to pick up. Rates jumped back up and 10 meters finally acted like it wanted to shed some QSOs. It did, and we stayed there as long as we could, touching on 15 meters from time to time.

As we turned into the final stretch, we started looking for the mults that should have been easy but somehow we missed. From the Caymans, Zone 7, on 10 meters can be difficult if you don't have some scatter to help you.

In the final hour, we really turned up all the wicks. John had a strong 15 meters run going into JA. Sunset at ZF is ~2300 UTC, so we also had good low-band propagation into Europe and the Middle East. I was jumping back and forth on 160 and 80 meters looking for mults while Joe was doing the same on 40 and 20 meters. I know the experienced low banders will laugh at this, but I want to tell you that the Beverages we had were killers. It was like a DSP for the noise. Stations that were barely perceptible on the phased verticals or inverted L were 559 to 599 on the Beverage. I sat there in awe listening to A61 on 160 meters calling CQ TEST over and over.

23:59:59 and It Was Over

The computer logs were all reading a little different. Our best guess was 12.5 million, which was very close to our goal of beating the 1997 score, but well shy of our 14 million goal. Everything worked very well despite a few mid-contest repairs. Compared to 1997, I would have to say the biggest improvements were with the TH7 performance, adding the 80-meter phased array and those two Beverage antennas. Inter-station interference was virtually nonexistent. It was a credit to K6AM's station design.

Our final score was exactly 12.5 million. Will it be clean enough to squeak by the 1997 score? Time will tell, but now it was truly Miller time. While we were still in our positions we broke out the cameras and took a few shots. Our host, ZF1EJ, joined us and we had an enjoyable hour of winding down. Did I mention the rain finally stopped?

After the Contest

This was my 8th contest trip to the Caymans. It was also my 20th wedding anniversary, and to celebrate I had arranged for my wife and three of our children to fly in Sunday night. They arrived around 0300 UTC and we proceeded to a condominium on Seven Mile Beach. The next four days the weather was perfect—sunny skies with no rain and, for the most part, calm seas. The family filled their days with some souvenir shopping, a submarine dive to the shelf, snorkeling in the lagoon with a visit to Stingray City, and wonderful walks on the fine white-sand beaches. The evenings were capped by eating at some of Cayman's finer restaurants.

A great contest effort and a week with the family in paradise capped off the perfect trip.

Oh yeah…I still can't believe what you could hear on that Beverage!

Acknowledgements

On behalf of the 2002 ZF1A team, I would like to thank each of you who took the time to work us. We would also like to thank the Cayman Amateur Radio Society for use of the ZF1A call sign during the contest, and a million thanks to Andrew Eden, ZF1EJ, for the use of his shack and antennas, and for his unwavering support.

QSLs for the 2002 CQWW CW ZF1A operation go to Joe, W5ASP. QSLs for ZF2AM go to K6AM, ZF2RR to N9XX, ZF2TR to W5ASP, and ZF2MK to K9MK.

We'll be back!

The C53M/C56R Suitcase Station

By Juha Valimaki, OH9MM
and Jeff Davies, N0DY

No aurora, cheap travel and accommodations, optimal propagation to North America and a highly sought-after multiplier. Those were our criteria for a QTH from which to operate CQ WW CW 2002. From Finland, one can easily find cheap package tours to EA8, CT3, CN, and 3V8. These QTHs all fit our criteria, but we were concerned that there would already be several teams in those countries. In West Africa, that left us The Gambia (C5) as the QTH of choice.

My first idea was to have a 10-person team from Finland. After a couple of weeks, I realized that assembling such a team was too difficult. Simply put, there weren't enough operators in Finland available for this occasion. The final Finnish team was OH3BHL, OH9MDV and OH9MM. Luckily, there is the cq-contest e-mail reflector! I received replies from some of the big multi-team operators in response to my invitation to join us. Then they would ask about our equipment. I had no problem sharing our antenna ideas, etc, knowing that the final setup would likely be much different! Girts, YL2KL, was interested in exchanging a cold Latvian winter for the huge pileups in The Gambia. In the end we signed on five experienced contesters from Latvia: YL1ZF, YL2GM, YL2KL, YL2LY and YL3CW. Team Latvia played the major role at contest time.

Weight Restrictions

If you don't have to pay for shipping to your DXpedition site, the logistics are rather easy. But regardless of whether you manage to get overweight permission from your tour operator, you always have some kind of weight restriction. If you are trying to do a serious operation there is never enough weight allowed. Traveling on a small budget forced us to make tradeoffs on everything in favor of weight. You must optimize the balance between weight and performance of your station—maximize the performance-to-weight (P/W) ratio. Of course, if you have unlimited funds you can have the heaviest equipment and pay any overweight charges. But we had only a modest budget.

In the C53M/C56R case, the main ham crew involved eight people. The weight allowance was strict—20 kg per person with checked-in baggage and 5 kg per person with carry-on baggage. Each extra kilogram cost 22 euros (1 euro is approximately 1 USD). There was no way to carry the ACOM-2000 power supply as a carry-on. We had been told that all the baggage would be weighed (and that information turned out to be correct). We had to carry all the gear with us. What to do?

Optimizing the P/W

If you have good information about the site and where your station will be set up, optimizing the P/W of your antennas can be done easily, even if your intention is to have full size antennas without traps or other kinds of loading. The biggest problem nowadays is to find some neighborly help while putting the ideas into action.

The view from the roof of where we stayed.

For example, we had a 2-element quad for 10, 15 and 20 meters raised about 15 meters above ground. It had separate feed lines for every band, so together with good rigs and band filters (plus stubs), it was no problem to run all three bands at the same time. Total weight—including small tube mast and coax—is 7 kg.

On the lower bands, the situation is even easier. We went with verticals because we wanted low radiation angles. For a 2-element array on 40 meters you need two 10-meter long fishing rods and some wire. Total weight is around 2.5 kg plus coax, with low radiation angles and reasonable gain. Not a bad P/W ratio! Eighty-meter verticals can be built in a similar fashion. In addition to fishing rods, you just need a 10-meter piece of 35/31mm aluminum and some wires for radials. The best point of these antennas is that they are not only quite effective, but also cheap.

In C53M we also used the SteppIR 3 element Yagi, which was also a good weight-for-performance tradeoff. It is not the cheapest antenna, but you can put out decent signals on the WARC bands with the same antenna. Our final setup included two full sets of antennas for all contest bands including 160 meters. We also had separate 6 meter and WARC antennas. Total weight came in around 70 kg.

To avoid interference between stations we didn't want to compromise on rigs. On the operating tables we had top-of-the-line Yaesu and ICOM equipment. That way, most of us were able to operate with

The eleven members of the C53M/C56R team.

Assembling the 2-element array for 40 meters.

the rig we were most familiar with. On the linear amplifier side, we followed the same strategy: we simply took what we had. The result was a collection of GU-74b-based linears. They are not the lightest, but we had nothing smaller. We packed rigs and linears in their original boxes so the total weight was not too bad. To save weight, we did not use regular suitcases. They were replaced by light sports bags. You should have seen the faces of the regular tourists!

In addition to the main ham team, we also had three other hams (DL9GFB, N0DY, LA6FJA), and they arrived early. Traveling by different means, they were able to carry some extra weight. For the rest of us, personal items were strictly limited to 3 kilos! When the temperature is over 30 degrees C with no rain, you don't need so much with you. A toothbrush is usually cheaper in the traveling location than back home. We also had a couple of nonham tourists with our main team who helped us a bit. In this way, the overweight surcharge was only slightly over budget.

Another option is to buy things you need on-site. If you don't have a local friend who will make sure that the things you need are available, though, you can only count on your good luck. And instead of shopping it's always more interesting to operate. After all, you soon realize how quickly your couple of weeks has gone by. Of course, in the case of a fixed station and a local host the situation is totally different.

Outstanding Results

There was nothing unexpected about the band conditions during this trip. The Gambia is one of those locations where propagation analysis programs do their jobs well. We also developed our Gambian way of judging whether conditions were good or not. If the US big guns were coming in at 59 plus, the conditions were bad. If they were 59 plus 50, then conditions were normal. You can guess how it was during contest time!

Instead of creating fancy operational concepts, we just put the available ham gear into bags and put that up in hotel rooms and on the roof. The total average cost per person was around 1500 euros. That included flight, hotels and most of the antenna hardware. That's not a bad price for a two-week trip. In total, the DXpedition netted 40,000 QSOs with around a 27 million score in CQ WW CW Multi-2 category. At this point, that's a claimed score of first place worldwide. There was, however, a great battle with A61AJ and 3V8BB, with a very narrow margin between claimed scores. So we'll have to wait and see.

The future of C53M/C56R looks good. Some plans for another CQ WW participation have also been made. NCJ

Phased Pennant Antenna Array

By Gary Nichols, KD9SV, George Taft, W8UVZ and George Guerin, K8GG

At PJ2X in Curacao, we built a side-by-side Pennant antenna array (for an introduction to the Pennant antenna, see K6SE's article in the July 2000 issue of *QST—Ed*) spaced approximately 250 feet apart. The antennas were fed through a 50:900-Ω matching transformer and were combined through equal lengths of coax (electrically identical lengths) with a W8JI "Magic T" combiner (**www.w8ji.com combiner_and_splitters.htm**). The Magic T is a two-core device with a bifilar-wound combiner core, and a 2:1 matching transformer to restore the line impedance.

This array was installed and directed toward Europe for the CQ WW 160-Meter CW contest. A KD9SV preamp was used to bring the antenna level up to a useful level. Without the preamp, many weak stations would not have been heard.

Construction is very simple. Each pennant requires only one support (a 22-foot tall mast) and something to tie the rope to from the pointed end. Two great things about these little antennas are that they are very quiet and require no ground system. The termination resistor used was a 910-Ω carbon composition. The value is not critical (according to *EZNEC* models), with anything from about 800 to 1000 Ω giving a good F/B pattern. The support mast can be metallic as long as the Pennant is spaced about two feet away.

For DXpedition use they can be packed into a small suitcase. There are no radials to mess with and it requires only a small space in which to construct and erect. If room for side-by-side installation is not available, two pennants can be fed "in-line" spaced 65 feet and fed with a 135-degree phase delay with excellent results (1/8 wavelength spacing plus 180-degree coaxial delay).

K8GG has constructed a phased pair at his home with an approximately 150-foot spacing and gets very good results on both 80 and 160 meters. Spacing much wider than 150 feet on 80 meters begins to degrade the azimuth pattern. A number of "tier one" 160-meter operators have given reports of "as good as a 1000-foot Beverage."

For more information on this array, you can contact the authors at **kd9sv@comcast.net** (Gary KD9SV), **w8uvz@arrl.net** (George W8UVZ) and **gmguerin@voyager.net** (George K8GG).

Pennant Antenna Construction Details

This is a small low-noise receiving antenna for those without adequate room for Beverage type antennas. A pair of side-by-side 150-to-300-foot-spaced Pennants is close to a 1000-foot Beverage in performance for DX reception.

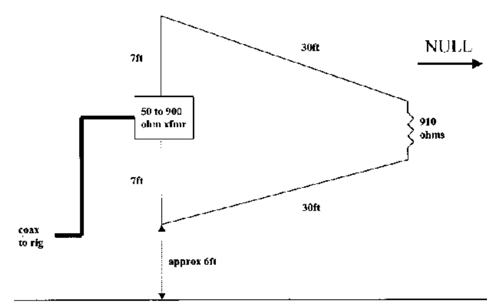
The Pennant can be mounted so that the bottom is approximately 6 feet above the ground. No ground system is required for this type of antenna.

Number 18 insulated appliance wire works well for Pennant antennas. The small difference in RF velocity (compared to enameled or bare wire) does not change the resultant forward lobe or F/B ratio.

Two side-by-side Pennant antennas can be separated 150 to 300 feet and fed through equal lengths of coax. A spacing of 150 feet works well for both 80 and 160 meters. A 300-foot spacing gives a beamwidth of approximately 55 degrees on 160 meters. One hundred and fifty-foot spacing on 80 meters has the same pattern as 300 feet on 160 meters.

A termination resistor value between 820 and 1000 Ω is adequate. The Front-to-Back null is approximately 30 dB for this resistance range. Nine hundred and ten ohms is a good average value.

A preamp having about 20 dB of gain is necessary on 160 meters. 10 decibels or more is adequate for 80 meters.



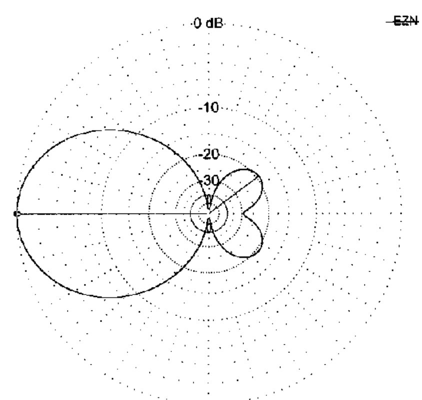
Observations from K8GG

0020-0400 UTC, 31 March 2003, at home

Last night on 3799 kHz, the only antenna I could hear ST0RY with was the pair of parallel Pennants at 45 degrees spaced about 160 feet apart. My 70-degree Beverage that heard so well on March 21 and 22 had some extra noise, probably a neighbor's appliance or lamp. I am sure glad the pennants are up and working. Earlier I worked a Belgian station just after the WPX contest closed at our sundown. Again, the Pennants had the best signal-to-noise ratio. I am using an extra preamp in series with the feed line and then into the Beverage box switch.

0230-0340 UTC, 4 April 2003, at home

With the pair of Pennants, W1AW on 1818 kHz is 30 to 40 dB above the noise. With the 70-degree Beverage the S/N ratio is 20db, and with the 120-degree Beverage, it is 25 dB. I think the 70-degree Beverage is overloaded from nearby AM 930 WBCK. The best DX on 1821.5 kHz is S53RF at about 339 working K3JJG. He cannot hear W5AU or me calling at 0333 UTC. I just worked some Europe and C53CW on 75 meters with good S/N ratios as well.



Azimuth pattern at 25-degree elevation of phased Pennants, side-by-side, 300 foot spacing (from W7EL's *EZNEC*). The 0 dB ring is –31.23 dBi.

Battling the Blizzard: The K4JA 2003 ARRL DX CW Contest

By Scot Herrick, K9JY
scot@k9jy.com

Familiarity finally returned as I was able to make it back to K4JA's in Virginia to participate in the station's effort in ARRL CW. A change in jobs and lack of vacation time prevented me from going out during the fall contest season; February would be the first opportunity to operate from Paul's fine station in a year.

Flying out of Chicago on Thursday night with Jerry, KE9I, should have been uneventful, but our flight was delayed leaving for no apparent reason—an ominous sign of things to come. Waiting out the delay in Chicago, KE9I casually noted that there was a big storm brewing that should hit the east coast over the weekend. I hadn't seen a weather report in days, but discounted what Jerry was telling me since predicting the weather is like predicting a contest—all plans are discounted once the contest begins.

Ramping Up

Friday's preparation went well and K4JA was ready for the contest on Friday night. Radios were checked, amplifiers were warmed up and *WriteLog* was locked and loaded across the four contest computers. More operators showed up as the day progressed. Eric, K9GY, was supposed to go with us out of Chicago, but the Army Reserves tapped his shoulder and moved him out to the Washington area. Driving to a contest at K4JA's was a luxury as Eric normally flew in with the Midwest contingent.

Next to show up was Larry, K7SV, on loan from NR4M's contest efforts. Then came Steve, K4FJ, for a return effort at the station. Last to show was Bruce, W3BP, checking things out in his engineering role as he made his way through the shack. Paul and Betsy greeted all, the gracious hosts they are.

We intended to operate as Multi-Two in the contest using two teams of three people rotating in shifts. Two people manned the run radios while the third hunted for multipliers and managed the band changes during the hour. Shifts ran for three or four hours, depending on time of day, and all people were able to work a full 24-hours during the contest.

Out of the Starting Gate

The contest opened with us calling CQ on 40 and 80 meters. The conditions were not that great with an A-index at 20 and a K-index of 4. Despite this, we had great runs on both bands. Working through the night in our shifts, we updated our replacement team with the current band conditions, the stations we were working and the quirks that we were seeing.

Anybody bring some sled dogs?

Left to right: K9GY, KE9I, W3BP. Backs to the picture (l to r): K7SV, K4FJ.

And so it went. Running Europe and Asia. Plowing through the Caribbean multipliers. Happily working all the South Americans who show up for the contest. Digging for multipliers and hollering with delight at breaking the pileups. While conditions were not as good as the year before, we seemed to be holding our own against last year's score, but we were nowhere near our planned goal for the contest.

The Weather Strikes Back

On Friday night, we noticed the 40-meter tower was not turning. Quickly investigating, we found the bolts holding the rotor together had worked themselves loose from the constant torque caused by the unforgiving winds. Fixing the rotor and returning to the house, Paul noted that the temperature was dropping and the winds continued to be very strong.

Right after the rotor was fixed, it started to rain. We could hear the rain static on the top beams of the stacks. Rain turned to freezing rain and finally to snow Saturday afternoon. The *Weather Channel* replaced our normal cable news channel so we could watch the radar images coming up every eight minutes. Between operating, eating and sleeping, little else was discussed except the storm that continued to brew and bellow outside the windows of our shack.

The wind and snow were swirling in a tempest's delight. Midwesterners calmly started to harass their Virginian counterparts about the relative merits of blizzards we experienced back at home. But the mood had changed from frivolous fun to making sure that we concentrated on the contest (and making sure we had buttoned down the hatch for the storm). Contest updates between shifts now also included updates on the storm.

By Saturday night the rain static was replaced by snow static, making the work tough on the low bands and limiting us to the lower antennas on the high bands. I don't think Paul built the higher antennas just to reduce the rain and snow static on the lower antennas, but we were very fortunate to have the stacks.

4-Square Problems

One of the comments noted on Saturday was the lack of directivity on 80 meters during the K4JA sunrise. Commentary on possible causes continued throughout the day on Saturday and the consensus was that there was a problem out at the 4-Square site. With an eye on the raging storm outside, the discussion continued because no one really wanted to fix a problem a thousand feet from the shack in 40-MPH winds.

As Saturday turned into Sunday morning, Paul finally thought he knew the answer and re-checked the connections behind the wall in the shack. Sure enough, one of the control wires was disconnected and it caused the 80-meter switching to fail. The 4-Square was stuck in the default northeast position. Fixing the problem allowed our Sunday morning operators to snag the elusive VK, ZL and Asian multipliers needed on 80 meters.

The Final Stretch

Sunday was a race to get to the end of the contest before the storm overtook us, all the while battling the incredible static noise on all the antennas. The operators from Virginia wanted to head out at 4 PM to try to get home before dark in spite of driving through blinding snow. The Midwesterners couldn't go anywhere until the flight out on Monday morning in Richmond, so we finished the contest.

The normally rambunctious after-contest pizza dinner was an abnormally quiet affair. All the normal restaurants we used for delivery were closed. We microwaved leftovers, checked the *Weather Channel* radar images and started to discuss the probabilities of flights leaving out of Richmond given the fact that Reagan National and Baltimore airports were already closed.

Homeward . . . More or Less

Checking the flight on the Internet confirmed the worst—our early morning flight was cancelled. Calling the airline resulted in a new twist—they didn't let you stay on hold if you connected! They announced that all agents were busy and promptly dropped the call after telling you to check the Web site for flight information. We called back. We were happy to see Paul's phone had redial capability.

Once through the electronic labyrinth, our agent noted that the cancellation was due to equipment problems and was able to book us on the following flight to Chicago leaving at noon. This was encouraging because everything north of us was closed. We went to bed cautiously hopeful that maybe we had missed the worst.

Waking on Monday, President's Day, and looking outside confirmed that the worst. It was pouring freezing rain. All the windows on the "windward" side of the house were coated so deep that everything outside was a blur. Checking the Internet, our flight was still on, the airport was open and the radar images looked a bit more promising to the south. We decided to head out in a four-wheel vehicle and make a slippery dash for the airport and home.

The driveway was drifted over with a foot of snow and finding our way down a 1000-foot driveway in a freezing rain is no easy matter. Breaking through to the road, we slid our way in the proper direction. After an hour at 35 MPH, we used our cell phone to check on the flight status. Naturally, the flight had been cancelled. We carefully turned around on the glare-ice roads and headed back to the K4JA hospitality hotel.

We re-booked flights out of Richmond for Tuesday. In the meantime, we checked scores, checked the competition, listened to 160-meters and worked a little DX.

Oh, about the contest . . . we racked up 9.75 million points. Looks like we did pretty well in a very competitive category. Thanks for all the contacts and the patience as we battled the blizzard of 2003.

NCJ

Is Your Multi-Op Full of Hot Air?

By Mike Hance, K5NZ
k5nz@teamcramp.com

No, not the operators … I mean the heat from multiple amplifiers.

Heat is a problem that plagues us here in the south. Ninety-degree-plus days and a couple of sizzling amps create a very uncomfortable situation. Why do you think you always see "Gator," N5RZ, shirtless while operating? Yes, it's a scary sight, I know, but now controllable!

I set out to find a way to exhaust the amplifier heat out of my shack. I have a small room and added extra air conditioning, but the heat from two amps running could not be overcome.

I tried muffin fans, exhaust-vented windows and so on. My problem was finding a fan rated for the heat level we are dealing with. To the rescue comes Glenn Thompson with Fantech. Fantech makes several models of clothes dryer boost fans. The fan can handle the heat and overcome the static pressure drop of a long run of ductwork. I settled on the FX4 model with WC15 remote variable-speed control. I used high-temperature 4-inch flexible ductwork to connect everything.

For the purpose of showing you how I have this set up, I mounted the fan below my ceiling for the test phase. See Figure 1. Now that I know it all works, the fan is mounted in the attic and only two drops of ductwork come down from the ceiling to the 6 x 6-inch pickup plenum (see Figures 2 and 3) sitting on the amp exhaust. Your local HVAC supplier can make you a duct board plenum. In the attic, I routed the exhaust side of the fan up to the eve vent at one end of the house. I have a dryer exhaust end installed to keep bugs out when the fan is not in use.

I have the remote variable speed control mounted by my operating position and it works like a dream. After taking temperature readings at the amp exhaust, use of the exhaust system has dropped the temperature from 150 degrees to less than 120 degrees. This can only make the tubes happy! Also, my air conditioning system can now hold the room at a nice 75 degrees even when it's 95 degrees + outside.

The retail costs are as follows: FX4 Fan $148, WC-15 Control $19, Duct Board Plenums and Collars $30 and Flex-duct $15. Contact Fantech at 941-309-6000 or on the Web at **www.fantech.net**.

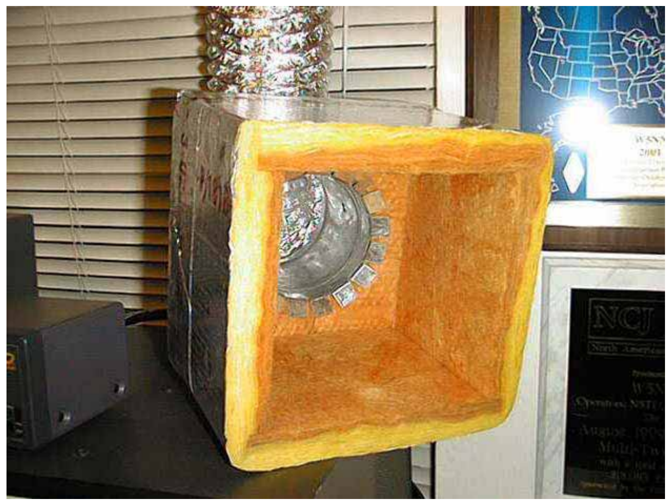


Figure 2—One of the 6 x 6-inch pickup plenums.

Figure 1—The test phase.

Figure 3—Final installation.

Reflector Ramblings...from the topband and the cq-contest reflectors

By Jeff Briggs, K1ZM
k1zm@aol.com

Installing the W8JI Keying Mod for the FT-1000D

I am posting this to the reflectors because I think it may help others in executing W8JI's keying mod to the FT-1000D transceiver (**www.w8ji.com/keyclicks.htm**).

Briefly, let me comment on this radio versus the FT-1000 MP and the Mark V. I've taken a look at the *before* and *after* scope traces of the keying in the D versus the MP and Mark V, and a "stock" D looks about the way an MP or Mark V looks *after* having installed the W2VJN current production mod.

Given that fact, it was questionable in my mind whether to tear into my radio at all. But after I saw the scope trace of what a W8JI *modified* "D" keying waveform looks like, the difference was so dramatic that I just decided to "suck it up" and go for it.

Please note that these notes refer to an FT-1000D transceiver and not to the MP or Mark V. Admittedly, modifying those radios requires more work, but happily, taking care of things on the D is really quite a simple matter.

As W8JI has noted, the mod goes on the AF board at the 7-pin connector J3024. The good news is that you do *not* need to take the board out of the radio to do the mod. The mod can be done by just "floating" the required components above the board and then insulating them in order to ensure they do not short to nearby components should they shift position over time.

I did as Tom said and cut the wire going to pin 2 on J3024. This is the second pin from the right when viewing this connector with the radio upside down with the front panel facing toward you.

You want to follow this wire into the harness and cut it to leave about 1.25 inches of wire remaining on pin 2 of J3024. Then pull the harness side of the wire out carefully to expose a similar length of wire.

I made up a little jig of the 2N3904, with the 1.5-kΩ 1/2-W resistor connected between the base and the collector of the transistor and tinned the emitter to accept a "tacked on" connection.

The third component required is a 10 µF electrolytic capacitor 25 V, the negative side of which must go to ground. Perhaps not the nearest point, but certainly the easiest and most accessible point at which to find chassis ground and mount the cap is at a mounting screw for the AF board in the middle of the board on the front panel side. This is about 2 inches to the left of where the cut wires wind up. It is also an open area allowing plenty of room for the cap to float above the board.

I chose an axial lead capacitor for this project (largely because its long leads were useful to me in spanning the distance involved) and mounted it flush onto a solder lug. This I placed under the board mounting screw noted above with the negative side of the capacitor almost directly on the lug. Then I dressed the positive axial lead with sleeving and passed it under an intervening wiring harness. The goal is to get the plus side of the capacitor into the general vicinity of where the two wires resulting from the cut to pin 2 at J3024 would reach.

Once this has been achieved, it is a straightforward process to tack the short wire from pin 2 to the emitter of the transistor and the flying harness lead to the collector. The positive lead of the 10 µF capacitor is most easily tacked on last and I should note that it is this lead that suspends the mod in mid air above the AF board. As an added measure to insulate the mod from all other components around it, I placed some PVC electrical tape over the top and bottom of the mod—just in case.

One other point worthy of mention is that it is a good idea to bend the solder lug up at a 45-degree angle right at the screw to ensure no adjacent foil traces wind up being jumpered when you tighten the screw to hold the lug in place. I also aimed the 10 µF capacitor into an open area on the board where it just floats out of harms way from nearby components. It is easy to see how to do this when looking at the board, and also easy to pass the positive axial lead under the harness to the right in order to make the connection to the base of the transistor where it meets one side of the 1.5-kΩ resistor.

I have now done this mod twice in the last 24 hours. The first time, because I was feeling my way, took about 2 hours. Much of this time was spent just getting my radio out of where it is sandwiched into the 160-meter operating position and then getting it hooked up again. The second time doing the mod took just about an hour, which includes taking the radio out of its operating position and then hooking up the station again.

The best news was hearing K9DX's comments this morning on Topband. John said it sounded great to him. Hmmm…now I only have a few more of these to do!

I hope this amplification of Toms' excellent post on March 9, 2001 is useful to anyone out there with an FT1000D. It was not hard at all to do this mod and the results are indeed compelling enough to make the effort more than worthwhile.

My thanks go to W8JI for taking the lead in getting the word out on this one.

NCJ

The Contest Forum at the Visalia International DX Convention 2003

Robert Wilson, N6TV
n6tv@kkn.net

One of the forums at this year's International DX Convention at Visalia was the Saturday morning Contest Forum moderated by Bob, N6TV.

The format of the Contest Forum was a discussion of pertinent topics in contesting. The panelists included Dave, NT1N; Gene, W3ZZ; Fred, K3ZO; Dick, N6AA and Bob, N6TV.

The first issue discussed was, "How close is too close?" The panelists were asked their opinion on how close could you get to another station before it was too close. The group consensus was 2 kHz on SSB and 500 Hz on CW.

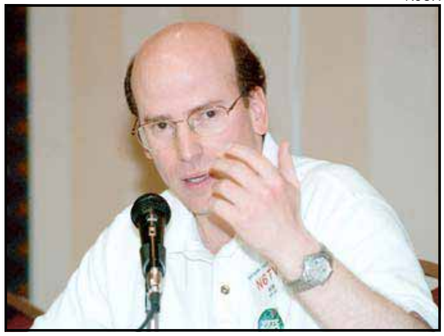
The second issue was "VHF for the VH1 generation." The discussion started by noting that these days most new hams seem to be active only on VHF. They are rarely—if ever—active on the HF bands. The question asked was "Are VHF contests the best way to introduce new hams to the excitement of contesting?" The consensus among the panelists was that the best way to introduce new hams to contesting was through Field Day.

The third issue focused on the ARRL's recent policy change to not publish line scores in *QST*. Expanded coverage, including line scores, is available for ARRL members on the Web. Non-members can download a *pdf* file to see detailed scores. The question asked was "Do you want to see detailed scores published in *QST*?" Four of the five panelists said "yes."

The fourth issue revolved around recording contests and then going back and fixing up the log before submitting it. The exit question asked was "Should the use of recording devices of any kind to correct a log be explicitly banned in the contest rules?" All five panelists replied "no."

The Contest Forum wrapped up by taking question from the audience. One question asked was "Should SO2R be a new class?" For an interesting analysis of this topic, please see the article "The Second Radio—Who's Using It?" in this issue by Ward, N0AX. NCJ

K8CX



Robert Wilson, N6TV

K8CX

Dick Norton, N6AA

Antenna Interactions–Part 1

Eric L. Scace, K3NA
K3na@arrl.net

Stop Squinting! Get the Big Picture

You are operating the ARRL DX contest from a well-equipped station on the USA's east coast. It's the middle of the European run and you're using a stacked Yagi array pointed northeast. Caribbean multipliers might be cruising the band, so you decide to improve your listening ability and transmitted signal strength in that region by rotating the low antenna southeast. The QSO rate starts to fade and you have difficulty holding your run frequency. What's wrong? Do you *really* know what your antenna pattern looks like after twisting the bottom Yagi down southeast?

Increasing personal computing power enables more comprehensive antenna models to be run quickly. During the last two years, as part of studies on phased arrays and stacked Yagis, I have assembled new meta-tools for antenna pattern analysis. In this series of articles, we'll apply these meta-tools to stacked Yagi systems as they are used in contests, identifying some situations where performance becomes impaired, and examining some approaches to reduce impairments.

This article focuses on understanding the meta-tools: what they do and the data provided. Future parts will apply these meta-tools to understand:

- Twisted stacks, where different Yagis are pointed in different directions.
- Pathological interactions between antennas on the same and different bands, and how these interactions can be minimized.
- Alternate feed systems for improved stack performance.
- Introducing the sky hemisphere

We've become accustomed to examining antennas with plots of gain in azimuth (at a specific elevation angle, typically the angle with the greatest gain) and in elevation at a specific frequency; see Figure 1 and Figure 2 for an example. These plots limit our understanding of the antenna system's behavior. While Figure 2 shows the gain of the antenna at all elevation angles, it does so only for the direction along the boresight of the antenna and the direction 180° opposite, in the exact rear of the antenna. We don not see what is happening at various elevations in other directions. Similarly, the azimuth plot only shows gain at a specific elevation angle; we are missing information about gain at other elevations. We are squinting at just two slices of the overall pattern.

Many modeling software programs can produce a sketch such as Figure 3—a three-dimensional, wire-frame outline of pattern lobes. Such sketches provide an overall impression of the pattern but contain no numeric data; we can't easily determine the exact gain in a lobe or null. Depending on the orientation of the image, some features may obscure others.

To better grasp the performance of an antenna system, we need to see what's happening in *all* directions at *all* elevation angles.

Imagine standing in the center of a transmitting system, looking around at the entire sky: from the horizon to the zenith, in all directions. This is the *sky hemisphere*.

Calculating Sky Hemisphere Patterns

We want to see exactly how much power is radiated towards (or received from) each point of the sky hemisphere at all azimuths and all elevations.

To tackle this modeling problem, let's begin by breaking up the sky hemisphere into small patches. Conventional antenna modeling software will be used to calculate the pattern gain for each patch. I used *NEC*4 for all the models in this series of articles, but software packages based on *NEC*2 may also be used with the usual attention paid to the limitations of *NEC*2.

The results will be assembled into the big picture by processing the output file generated by the *NEC* engine (usually labeled with a .NOU extension).

Choosing Patches

Several criteria apply to the division of the sky hemisphere into patches:

1. The location of patches should be easy to describe to the *NEC* engine.

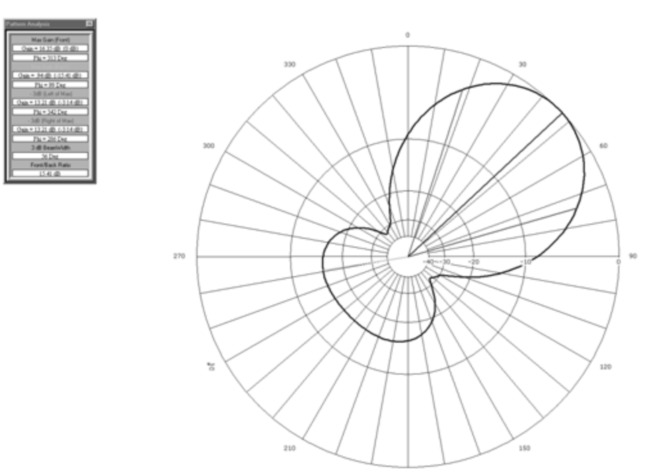


Figure 1—Azimuth pattern, at an elevation of 11°, for a stack of two Yagis on 20 meters. Each Yagi contains six elements on a 48-foot boom using an OWA design. The Yagis are mounted at 50 at 100 feet and pointed northeast.

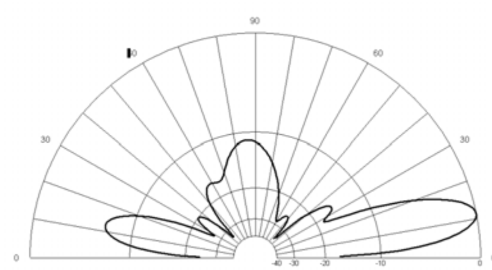


Figure 2—Elevation pattern, at azimuth 46°, for the antennas described in Figure 1.

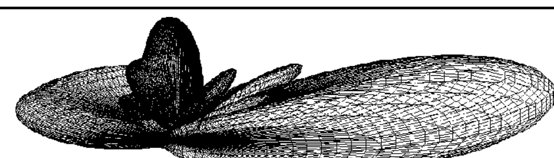


Figure 3—Three dimensional wire-frame outline of pattern for the antennas described in Figure 1.

2. The quantity of patches should be small enough to avoid long computing times.

3. To facilitate the calculation of pattern statistics, the patches should be of equal area.

4. Enough patches should be used to reveal the details of the antenna system pattern.

NEC uses the “RP” instruction to calculated pattern data. One convenient approach to instructing the *NEC* engine uses rows of patches, each row at the same elevation angle. Each row requires one RP instruction card, specifying an elevation angle and the number of equal-spaced azimuths to calculate at that elevation.

For HF systems, one-degree steps are usually adequate to resolve pattern detail in the vertical (elevation) direction. To resolve pattern details in the horizontal direction, a one-degree step in azimuth is adequate at low elevation angles. I have selected a 1°x1° patch at the horizon as the basic patch area. Figure 4 illustrates the shape of one patch at the horizon, centered around the location for which *NEC* will calculate gain.

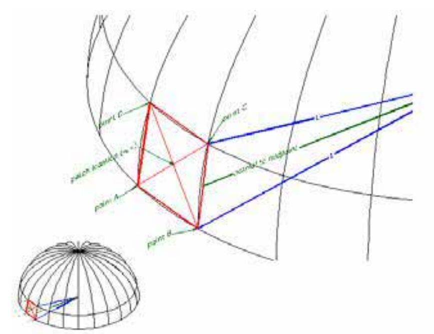


Figure 4—Left: the sky hemisphere. Right: sample patch on the sky. The four vertices of a rhombus, including points A, B and C, lie on the hemisphere representing the sky. The center of the patch represents the azimuth θ and elevation α for which *NEC* calculates gain. For clarity in the figure, this sample patch is 100 times larger in area than the patches used in the actual calculations.

The area of the sky hemisphere covered by successively higher elevation angles decreases, until one reaches a single point at the zenith (90° elevation). Therefore, if one uses equal area patches, fewer patches are required for rows at successively higher elevation angles. The sidebar “Dividing the Sky into Patches” explains how to calculate patch area and the number of patches required at each elevation angle. For this study, the sky hemisphere was tiled with 89 rows containing 20,629 patches. Table 1 lists the elevation angles and corresponding number of azimuths. The *NCJ* Web site contains a file with the 89 RP cards needed to calculate antenna patterns for the sky hemisphere.

Meta-tools for pre- and post-processing *NEC* data

My meta-tools work sequentially, preparing instructions for the *NEC* engine, running the *NEC* engine and then manipulating the results. The basic steps are:

1. Clean up the *NEC* instruction file.
2. Run the *NEC* engine.
3. Sort through the *NEC* output file, compiling statistical data and extracting the gain at each azimuth and elevation.
4. Create a map showing gain on the sky hemisphere, annotating the map with statistics and other useful data.

The *NEC* instructions for many of my models are generated by custom *Excel* spreadsheets. I build these spreadsheets to generate *NEC* instructions for a family of models based on a similar scenario. During this series, many examples use Paul K4JA’s 20-meter antenna farm. All of Paul’s 20-meter antennas are described in one of my custom *Excel* spreadsheets. By setting a few parameters, I can include or exclude certain antennas, specify which direction each antenna is pointing, and specify the current and phase fed into each antenna. The spreadsheet then creates a text page with the necessary *NEC* instructions to analyze the situation.

Frequently, these *Excel* spreadsheets provide text with blank lines (instructions which have been suppressed as not relevant for a particular run of the model). *NEC* engines barf when a blank line is found in the instruction set. My first meta-tool, *NECInputClean*, combs through the text file and removes any blank lines. At this point I often use *NECWin* to visually verify the wire and segment geometry.

You don’t need to create custom *Excel* files in order to use the remaining meta-tools. Any *NEC* modeling software package such as *NECWin* or *EZNEC* may be used to generate a *NEC* instruction file. I build custom *Excel* spreadsheets simply to save time when running many models of complex antenna systems.

After the *NEC* engine runs, another meta-tool *NOUTrim* sorts through the .NOU output file to extract into separate files:

The “CM” comment cards; these lines of text usually describe the scenario being modeled.

• A list of all feedpoints in the system, with their drive point voltage or current levels and phase.
• Gain at each azimuth and elevation.
• Additional pattern statistics discussed below.

The meta-tool *NOUPlot* then creates the annotated map of the gain over the sky hemisphere. This information is stored in a .PS PostScript file. The .PS file can be printed directly by PostScript-compatible printers. It can also be viewed on the screen using the ment. I

Table 1

Number of equal area patches at each elevation angle. At the horizon, a patch occurs every 1° in azimuth.

Elev	*Patches*	*Elev*	*Patches*	*Elev*	*Patches*	*Elev*	*Patches*	*Elev*	*Patches*	*Elev*	*Patches*
0.50	360	15.51	347	30.54	311	45.59	253	60.68	178	75.84	90
1.50	360	16.51	346	31.54	308	46.60	249	61.68	172	76.86	83
2.50	360	17.52	344	32.54	304	47.60	244	62.69	167	77.88	77
3.50	359	18.52	342	33.54	301	48.61	239	63.70	161	78.90	71
4.50	359	19.52	340	34.55	297	49.61	234	64.71	155	79.92	65
5.50	358	20.52	338	35.55	294	50.62	230	65.72	149	80.94	58
6.50	358	21.52	335	36.55	290	51.62	225	66.73	144	81.97	52
7.50	357	22.52	333	37.56	286	52.63	220	67.74	138	83.01	45
8.50	356	23.52	331	38.56	282	53.63	215	68.75	132	84.05	39
9.51	355	24.53	328	39.57	279	54.64	210	69.76	126	85.10	32
10.51	354	25.53	326	40.57	274	55.64	204	70.77	120	88.16	26
11.51	353	26.53	323	41.58	270	56.65	199	71.79	114	87.23	19
12.51	352	27.53	320	42.58	266	57.66	194	72.80	108	88.35	12
13.51	350	28.53	317	43.58	262	58.66	189	73.81	102	89.46	5
14.51	349	29.53	314	44.59	257	59.67	183	74.83	96		

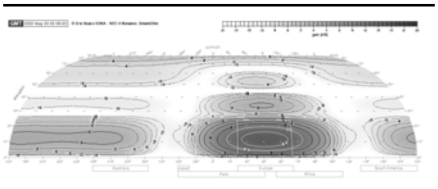


Figure 5—Map of gain over the entire sky hemisphere for the same 20-meter stacked Yagis described in Figure 1. See text for detailed explanation of the map features.

GhostView/GhostScript utilities.

Why do I call *NECInputClean*, *NOUTrim* and *NOUPlot* "meta-tools"? A meta-tool is a "tool of tools." My meta-tools are instructions to the following software packages, created and maintained by other dedicated programmers:

〈 *GNU AWK* (GAWK): a utility that parses text files to extract data that fits user-specified patterns. GAWK is available at **www.gnu.org/software/gawk/gawk.html**. The GNU software is free under the terms of the GNU public license.

〈 Generic Mapping Tool (GMT): a comprehensive toolkit for mapping data found at **gmt.soest.hawaii.edu**. GMT is also free under the terms of the GNU public license.

〈 GhostScript and GhostView: utilities for manipulating PostScript files. These utilities are available at **www.cs.wisc.edu/~ghost/** under the Aladdin free public license system. Registration is not required but the author would appreciate a $40 (Australian) registration (about US $25).

The *NCJ* Web site contains a sample of each of my meta-tools. The tools are annotated so that you can modify them for your projects and computing environ-

Dividing the Sky into Patches

In the main article, Figure 4 represents a patch as a rhombus with four vertices lying on the sky hemisphere, centered on the data point whose gain *NEC* calculates. To calculate the area of this rhombus, begin by calculating the length of the sides. Assume the sky forms a hemisphere with unit radius; i.e., radius = 1. Referring to Figure 4, let $\Delta\alpha$ represent the vertical (elevation) angle between points B and C, measured from the origin of the hemisphere (the location of the antenna). The vertical distance between points B and C is the base of an isosceles triangle; the other two sides are the radii shown in the figure. The vertical distance between points A and D is identical. From trigonometry, find the vertical distances BC and AD as follows:

$$BC = AD = 2\sin\left(\frac{\Delta\alpha}{2}\right)$$

The meridians (lines of equal azimuth) converge together as they reach the zenith. Horizontal distance AB is larger than CD. Find the horizontal distances as follows:

$$AB = 2\cos(\alpha_{AB})\sin\left(\frac{\Delta\theta}{2}\right)$$

$$\text{and } CD = 2\cos(\alpha_{CD})\sin\left(\frac{\Delta\theta}{2}\right)$$

where α_{AB} is the elevation angle at points A and B, and α_{CD} is the elevation angle at points C and D.

Having now found the lengths of all sides of the parallelogram, refer to Figure A in this sidebar and find the area as follows:

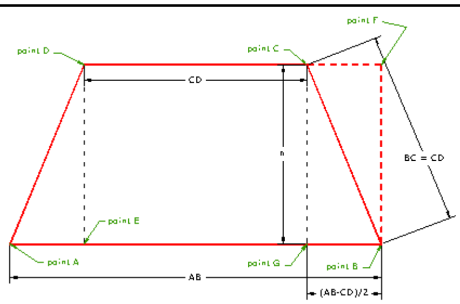


Figure A—Patch area as a rhombus. To calculate the area, clip the triangle formed by points ADE on the left side and move it to the dotted location BCF on the right side. The area BFCG is now a rectangle whose area is height h multiplied by width 1/2(AB-CD). Add this area BFCG to the area of the second rectangle EFCD to get the complete area of the rhombus.

$$\text{area} = (h \times CD) + \left(h \times \frac{AB - CD}{2}\right),$$

the sum of the area of two rectangles shown in the figure.

$$\text{area} = h\left[CD + \frac{AB - CD}{2}\right]$$

$$\text{area} = h\left[\frac{AB + CD}{2}\right]$$

$$\text{where } h = \sqrt{BC^2 - \left(\frac{AB - CD}{2}\right)^2}$$

from the properties of right triangles.

Because antenna patterns at HF vary more rapidly for each degree of elevation change than for a degree of azimuth change, the height of each row was kept as close as possible to 1° in elevation. Each row must contain an integral number of patches, and an integral number of rows must fit between horizon and zenith. The number of patches in each row was set to make the patch areas as nearly identical as possible. The spreadsheet's far right column shows the variance in area compared to patches on the horizon. The second column from the right provides the ratio of each row's patch area to the area for patches on the horizon.

The twin constraints of integral number of patches per row and integral number of rows require the patch area to vary slightly. For elevation angles below 62°, the worst patch-area variation is less than ±1/2%. Patch areas between 62° and 76° elevation have a worst-case variation of less than ±1%. Above 76°, the worst patch area variation is less than ±1 1/2%, except for the last five patches that meet at the zenith. These last five patches are 2.2% smaller than the mean patch size.

For the entire set of patches, the average error in patch area is less than 0.0019%. Even for patches at elevation angles above 75°, the average error is less than 0.038%. This error lies well within the overall error limits of *NEC*-4 modeling.

layer	patch mid-pt elevation	azimuth steps	elevation angles: bottom	elevation angles: top	dimensions: bottom	dimensions: top	dimensions: height	area: patch	area: variance ratio	area: variance
1	0.50	360	0	1.00000000	0.00872654	0.00872521	0.00872654	0.00007615	1.00000000	
2	1.50	360	1.00000000	1.99984769	0.00872521	0.00872122	0.00872521	0.00007611	1.00045701	-0.00000003
3	2.50	360	1.99984769	2.99923860	0.00872122	0.00871458	0.00872122	0.00007603	1.00152412	-0.00000012
4	3.50	359	2.99923860	4.00065049	0.00873886	0.00872952	0.00873886	0.00007633	0.99763913	0.00000018
5	4.50	359	4.00065049	5.00099241	0.00872952	0.00871753	0.00872952	0.00007615	0.99992685	0.00000001
6	5.50	358	5.00099241	6.00275083	0.00874188	0.00872717	0.00874188	0.00007636	0.99725533	0.00000021
7	6.50	358	6.00275083	7.00282353	0.00872717	0.00870982	0.00872717	0.00007609	1.00077258	-0.00000006
8	7.50	357	7.00282353	8.00370415	0.00873422	0.00871415	0.00873423	0.00007620	0.99931276	0.00000005
9	8.50	356	8.00370415	9.00508948	0.00873862	0.00871582	0.00873863	0.00007626	0.99846140	0.00000012
10	9.51	355	9.00508948	10.00667450	0.00874037	0.00871482	0.00874038	0.00007628	0.99821944	0.00000014
11	10.51	354	10.00667450	11.00815294	0.00873944	0.00871115	0.00873945	0.00007625	0.99858860	0.00000011
12	11.51	353	11.00815294	12.00921763	0.00873583	0.00870480	0.00873584	0.00007618	0.99957135	0.00000003
13	12.51	352	12.00921763	13.00956107	0.00872953	0.00869578	0.00872955	0.00007606	1.00117093	-0.00000009

Figure B—Portion of spreadsheet that calculates sample patch elevations, azimuths, dimensions, areas and variance in area for nearly equal area patches covering the sky.

Table 2

Distribution of K_p values during 1994 January 1 through 2003 May 19.

K_p value	*Number of 3-hr periods*	*% of 3-hr periods*
0	1533	5.6%
1	5276	19.3%
2	8590	31.4%
3	7569	27.6%
4	2911	0.6%
5	1055	3.9%
6	319	1.2%
7	99	0.4%
8	20	0.1%
9	8	0.03%

Table 3

Post-processing meta-tools statistical results.

Antenna	*Height*	*Az*	*Drive Conditions* *Impedance*	*Current*	*Phase*
Middle 6-el 48-ft Yagi	100 ft	46°	29.2 – *j* 6.1 Ω	1.000 A	-90.0°
Bottom 6-el 48-ft Yagi	50 ft	46°	29.8 – *j* 5,2 Ω	1.000 A	-90.0°

Power efficiency: 87.0%
Maximum gain: 16.67 dBi
Azimuth: 46Υ
Elevation: 111°

Frequency: 14.025 MHz
Ground: Finite
Solution: Sommerfeld
Ground: Very good
Dielectric (σ): 13.0
Conductivity: 5.0 mS/m

	Zone 1 Europe 22-70Υ 1-24Υ	*Zone 2 Transition 345-105Υ 1-26Υ*	*Non-Target Area*
Mean gain*:	13.37 dBi	7.05 dBi	-7.14 dBi
Average dev from mean:	±4.90 dB	±7.54 dB	±7.36 dB
Max gain:	16.67 dBi	14.32 dBi	1.02 dBi
Azimuth:	46Υ	70Υ	261Υ
Elevation:	11Υ	11°	12°
Minimum gain:	1.08 dBi	-15.60 dBi	-39.60 dBi
Azimuth:	70Υ	345Υ	310Υ
Elevation:	1°	1°	43°

ment. I use a batch file to run all the meta-tools and the *NEC* engine in the proper order; the batch file is also on the Web site.

Example: 20-Meter Yagi stack

Figure 5 shows the results for a 20 meter stacked Yagi system over very good ground. Two 6-element aluminum Yagis on 48 foot booms, mounted at 50 and 100 feet, are fed with equal currents in phase. The stack is pointed towards Europe from Virginia. A color version of this map appears on the cover of this issue. A 750 MHz laptop with 512 MB memory consumed 35 seconds to run *NEC* and all meta-tools for this example.

The map is a Eckert IV projection of the sky hemisphere. The horizontal direction represents azimuth, with North located in the center, East towards the right, and West towards the left. South is the extreme right and left edge of the map. The actual azimuth bearing in degrees is labeled at the top and bottom of the map. Rectangular boxes below the map show the span of azimuths needed to cover a particular continent from a location around Washington DC.

The vertical direction is elevation, with the horizon at the bottom and the zenith at the top. Elevation angles are marked on the sides of the map. Note that the projection tapers from the horizon to the zenith!

The antenna gain is represented by color (on the Web site image) or intensity of gray. Color/gray blobs on the map represent the lobes of the antenna. White areas have very low power: less than –21 dBi. A color- or gray-scale bar in the upper right corner shows the relation between color/gray and dBi of gain. Contours of equal gain in steps of 3 dBi also map out the pattern gain; contours for gains less than 0 dBi are dashed.

In this example, the main lobe is pointed towards Europe with a peak at 11° elevation. There is also a minor lobe pointed to Europe with about +1 dBi of gain at 34° elevation, and a faint lobe of –7 dBi even higher in the sky.

The rear lobe of the antenna is very broad, covering from 160° to 295° azimuth with a signal between –3 dBi up to a maximum of +1 dBi. And there is a minor lobe pointing straight up at the zenith of –4 dBi.

In Eckert projections, equal areas on the page correspond to equal areas in the sky, regardless of azimuth or elevation. That means you can compare the relative coverage of lobes by looking at the area covered by the blobs of color/gray. Table 2 provides statistics about this antenna system.

Antenna System Efficiency

Antenna system efficiency describes how well the system converts transmitter power to radiated signals (or received signals gathered by the antenna into power into the receiver). The *NEC* output provides a figure for "antenna efficiency," but this figure excludes ground losses.

A more direct way to measure the efficiency of the modeled antenna system is to analyze how much power is radiated to the entire sky hemisphere. An ideal antenna will radiate all of its power; a very lossy antenna will radiate only a small portion of applied power.

The power radiated to the entire sky can be compared to an isotropic antenna in free space to calculate power gain to the entire sky, G_{sky}. A perfect, lossless antenna over perfect ground would radiate all of its applied power into the sky hemisphere, yielding twice the signal of an isotropic radiator that must fill a sphere of free space. A perfect antenna over perfect ground therefore has a $G_{sky\text{-}perfect}$ = +3.01 dBi.

"Power Efficiency" compares an antenna's G_{sky} to that a perfect antenna over perfect ground:

$$\text{Power Efficiency} = 100\% \times \frac{10^{G_{sky}}}{10^{G_{sky\text{-}perfect}}},$$

$$\text{which simplifies to } 100\% \times \left(\frac{10^{G_{sky}}}{2.00}\right)$$

To average together the power gains across the entire sky, a conversion from gain (in dBi) to relative power must occur before averaging:

$$P_{\alpha,\theta} \equiv 10^{G_{\alpha,\theta}}$$

where:

$$G_{\alpha,\theta} \equiv \text{gain calculated by NEC-4 at elevation angle } \alpha \text{ and azimuth } \theta$$

With values of relative power for each patch of sky in hand, the values can be averaged together and converted back to gain:

$$G_{sky} = 10\log\left(\frac{\sum_{\alpha=0^\circ}^{90^\circ}\sum_{\theta=0^\circ}^{360^\circ} P\alpha_1\theta}{m_{total}}\right)$$

where :

$m_{total} \equiv$ **total number of patches.**

$P_{\alpha,\theta} \equiv$ **power radiated at elevation α and azimuth θ.**

The meta-tools do all this work for you. Table 3 shows this stacked Yagi system has a power efficiency of 87%.

Target Zones

Frequently one wishes to compare antenna systems for a specific application. The meta-tools allow you to specify one or two target zones. Zones appear on the map as white rectangles and are described in the statistics table.

Table 3 shows both target zones were used. The first is identified as "Europe" and covers the European azimuth range. This zone includes elevation angles from the horizon to 24°. The current *ARRL Antenna Book* contains the results of propagation modeling studies by Dean Straw, N6BV. These show that signals from the Washington, DC area to Europe on the 20 meter band have elevation angles of 24° or less 99% of the time under undisturbed conditions.

Note that undisturbed conditions occur only about half the time. Table 1 shows the time distribution of K_p values. Since 1994, January 1, K_p values of 0, 1 or 2 occurred 56% of the time. Although N6BV's data does not include disturbed conditions, one could defend an assumption that high elevation angles are less usable during many disturbed conditions. If this assumption is true, N6BV's elevation angle data overstates the times when higher angles may be used.

Returning to Table 3, the average gain of this stacked Yagi system across Europe is +13.4 dBi, with an average variation of ±4.9 dB from the mean. The table identifies locations of the maximum and minimum gain within the zone. The minimum gains tend to occur at the corners of the zone box; e.g., highest and lowest angles to Spain and northern Scandinavia are down –12 dB from the peak gain. An ideal antenna for Europe would have high maximum gain (loud is good!)… low deviation (i.e., a uniform pattern throughout the zone)… and high minimum gain (no holes in the pattern within the target zone).

The second target zone in this example is a transition zone around the main beam. When calculating the statistics for the second target zone, the meta-tools exclude points that fall within the first target. The second target zone is useful for excluding the sides of the main lobe from the statistics for the rest of the sky hemisphere (non-targeted area). The second zone is also useful when evaluating performance while pointing to two different areas (e.g., twisted stacks to be examined in a future part).

Non-Targeted Area

The last set of statistics is for the non-targeted area; i.e., the areas of the sky outside of the two target zones. For this stacked Yagi system, the mean gain to the rest of the world is –7.1 dBi with the worst value of +1.0 dBi located at 261° azimuth 12° elevation. Clean patterns will have minimum average gain throughout the non-targeted area and very low value of gain in the worst minor lobe.

Note that the meta-tool uses a floor value in calculating mean gain and deviation from the mean. For this study, the floor is set to –15 dBi. Any patch in the sky whose modeled gain is less than the floor will be treated as having the floor value when calculating statistics. Variations in construction methods, accuracy in cutting to modeled dimensions and other factors conspire to make it difficult to achieve deep nulls in antenna patterns. In this example, the floor is over –30 dB below the peak gain of the main lobe. By setting a floor, we avoid optimizing designs based on unachievable pattern nulls.

Drive Impedance, Matching Systems and Baluns

Using data from the *NEC* engine, the meta-tools also calculate drive impedances. Current feed situations are detected and the impedances are corrected for the common workaround used to describe current feeds to *NEC*. In our example, Table 3 shows both antennas have nearly identical drive impedances of about 29 – *j*5 Ω. This stack is easy to feed with identical, in-phase currents – but identical matching system and balun construction must be used! If the Yagis have a different baluns or matching systems, an unplanned difference in phasing and current levels could be introduced to the system, resulting in a different (probably worse!) pattern.

Conclusion

We've been introduced to meta-tools, based on publicly available software utilities, to generate a comprehensive picture of antenna patterns, along with statistics relevant to contest station design objectives. Next time we'll apply these tools to reveal how stacked Yagis can be abused to improve (and sometimes degrade) contesting performance.

Notes:

Wessel, P, and W. H. F. Smith, New, improved version of Generic Mapping Tools released, EOS Trans. Amer. Geophys. U., vol. 79 (47), pp. 579, 1998.

Wessel, P., and W. H. F. Smith, New version of the Generic Mapping Tools released, EOS Trans. Amer. Geophys. U., vol. 76 (33), pp 329, 1995.

Wessel, P., and W. H. F. Smith, New version of the Generic Mapping Tools released, EOS Trans. Amer. Geophys. U. electronic supplement, **www.agu.org/eos_elec/95154e.html, 1995**.

Wessel, P., and W. H. F. Smith, Free software helps map and display data, EOS Trans. Amer. Geophys. U., vol. 72 (41), pp. 441, 445-446, 1991.

Smith, W. H. F., and P. Wessel, Gridding with continuous curvature splines in tension, Geophysics, vol. 55 (3), pp. 293-305, 1990.

NCJ

2003 Hamvention Contest Forum Report

Doug Grant, K1DG
k1dg@contesting.com

The 2004 Contest Forum was well attended, possibly due to the rain in the flea market. Attendees who were just looking for a dry place to sit down were rewarded with a terrific program.

The first speaker was Tree Tyree, N6TR. Tree began his presentation, titled "Domo Arigato, Contest Roboto" in French, leading many of us to wonder if he had finally lost his marbles from too many SO2R Sprints. Turned out he wanted to lead the group in a pronunciation lesson for the word "Cabrillo" ("Ka–brie–o"). Tree went on to describe what happens to your contest log after you hit the **SEND** button, all the way through to the beginning of the checking process. He showed part of the program that processes the logs, including the part that looks for obvious errors like entry class, wrong date, wrong contest, etc. He then showed how some entrants "dance with the robot" by fixing one error only to have the robot reject the log for another error. The robot and associated processes are mostly built using existing software (revision-tracking tools, etc.) that has been adapted to the purpose by Tree and Trey, N5KO. Musical accompaniment for Tree's presentation was provided by Styx.

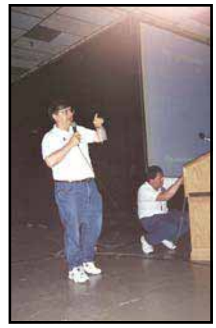
After he left the Contest Forum, Tree QSYed to another meeting room where he received the "Ham-of-the-Year" Award from the Hamvention for his work establishing and promoting the Kid's Day operating event as well as school demonstrations of ham radio including QSOs with astronauts aboard the International Space Station. Next time you work Tree, make sure you congratulate him. I'm sure he would appreciate it…especially during a Sprint.

Second on the program was ARRL Contest Branch Manager Dan Henderson, N1ND. Dan reported on the improvements to contest coverage at the ARRL, from expanded human-interest and interview-format write-ups in the magazine to greatly-expanded searchable results databases on the Web. He reported that contest entries are up in ARRL events, with over 18,000 logs received in the 2001-02 season, and submissions on track to beat that in the current season. He noted that the logs received contained about 40,000 call signs, and 20,000 that appeared only in one log, and are probably copying errors. In other news, Dan reported that the ARRL's e-mail publication *The Contest Rate Sheet*, edited by Ward Silver, N0AX, now has over 8000 subscribers, which shows great interest in the subject. And throughout the presentation, Dan handed out several Club Competition gavels for various contests.

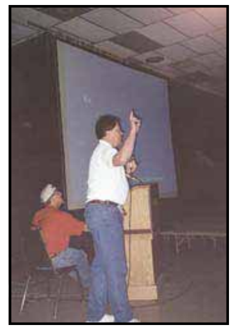
The traditional Zone Roll Call was held, and thanks in no small part to the contribution of Phil Goetz, N6ZZ, who has now operated from over 35 different zones, we were able to sweep all 40. This has turned out to be a good way to see who is visiting from around the world.

Next up was "Resuscitation of a Legendary Contest QTH–PJ2T", by Tom Kravec, W8TK, and Geoff Howard, W0CG, of the Caribbean Contest Consortium. They described the lengthy process of restoring and rebuilding the station on Curacao that we have all worked many times. When the original owner, John Thompson, W1BIH/PJ9JT, left the island in urgent circumstances, the property quickly deteriorated as iguanas and other pests invaded and took over the house, leaving a huge mess. In addition, the paperwork (in Dutch!) required to purchase the house and secure permission for towers took many months to sort out, and tried everyone's patience. But persistence and hard work paid off as they usually do, and the station is now a solid performer, routinely turning in record scores.

The final presentation was the "WRTC2002 Finland" movie, written and edited by James Brooks, 9V1YC. Even though the movie is an hour long, nobody left the room. Fast-paced, with a professional announcer (from ESPN Europe), the movie captures the excitement of the competition, the camaraderie of all the participants and the enthusiasm and pride of the Finnish organizers brilliantly. If you weren't at Dayton, and missed the movie, you should buy a copy and show it to your family and local radio club. Show it a club meeting before a major contest, and your club's interest in contesting will undoubtedly be kicked up a notch. You can order the video (as well as others by 9V1YC) on the Web at **home1.pacific.net.sg/~jamesb/**.



K1DG warming up the crowd at the start of the 2003 Contest Forum



N6TR making a point during his Cabrillo presentation. That's N5OT helping in the background.

The Second Radio—Who's Using It?

H. Ward Silver, N0AX

Single-op, two-radio (SO2R) operation has become widespread among top contest operators around the world. Just a few stations were using the technique in the mid-nineties, but technology has progressed so quickly that a turnkey SO2R station is nearly available off-the-shelf.

A bit of background first—typically, one radio is used as a "run" radio to call CQ while the second is used to tune for multipliers or new stations on a different band. When a new station is found on the second radio, the operator interleaves transmissions between the two radios to keep making QSOs on the run frequency while logging the new station. Some stations leave the run frequency quiet to work the new stations, while more skilled operators can efficiently conduct QSOs on both frequencies. This is hardly a recent development, however.

Stations like K4VX and W4KFC were known to have used a second radio as long ago as the mid-1950s. Due to the various technical and operational difficulties involved, the use of a second radio was a novelty until a convergence of technologies made the technique much more powerful and accessible. Controllers, filters, and logging software can today be combined to make the second radio extremely useful, even with both stations running full power to antennas on a single tower.

As SO2R has become more common, appearing in many of the Top Ten positions in major contests, the question has been raised as to whether using a second radio is "just progress" or does it warrant its own category? Thus far, the discussion has been mostly limited to anecdotes and reactions to specific scores. The trend has not really been analyzed objectively and that's the intent of this article—to take a first step towards understanding the effects of SO2R operation.

Data and Overall Behavior

I decided that to get a good picture of where SO2R is appearing, I should take a look at the competitive scores. These operators are the ones vying for the Top Ten spots and are typically "early adopters" of technology that helps them compete. I wanted to know how many are using SO2R and in what contests and modes. In addition, I wanted to know specifically how many of the top scorers were using SO2R.

To that end, I e-mailed 376 of the top US and VE contesters that had a top claimed score in any of the 2002-2003 Sprint, SS, WW, and ARRL DX contests in the single-op, all-band, high-power or low-power (SOAB-HP and SOAB-LP) categories in either mode. One hundred and ninety of them responded and I was able to determine the data of another 25 from their soapbox comments. When the dust settled, I had the one-or-two radio information for 918 contest entries.

The first statistic I compiled was to find out how frequently SO2R was used. Overall, SO2R was used 28% of the time. (Overall is used in this article to mean statistics derived from all 918 data points.) Figure 1 shows that 54% of the respondents never

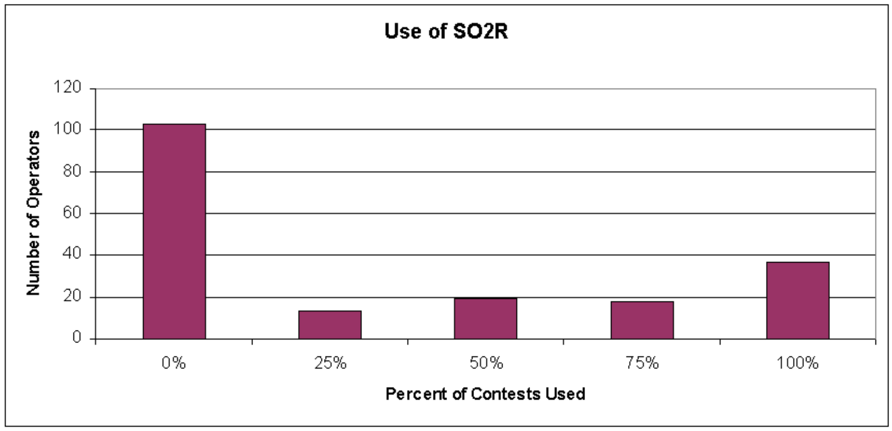


Figure 1—The survey response distribution.

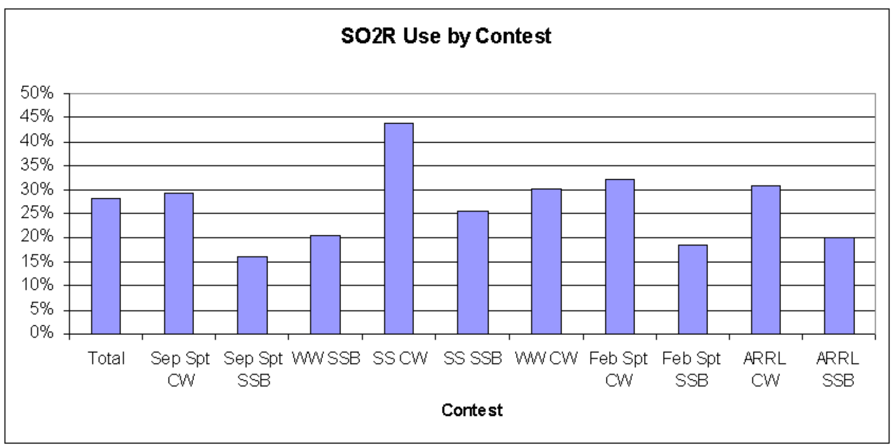


Figure 2— Looking at the individual contests, the average among all contests is that SO2R is used 28% of the time. It's most common in SS CW and least common in the Fall SSB Sprint.

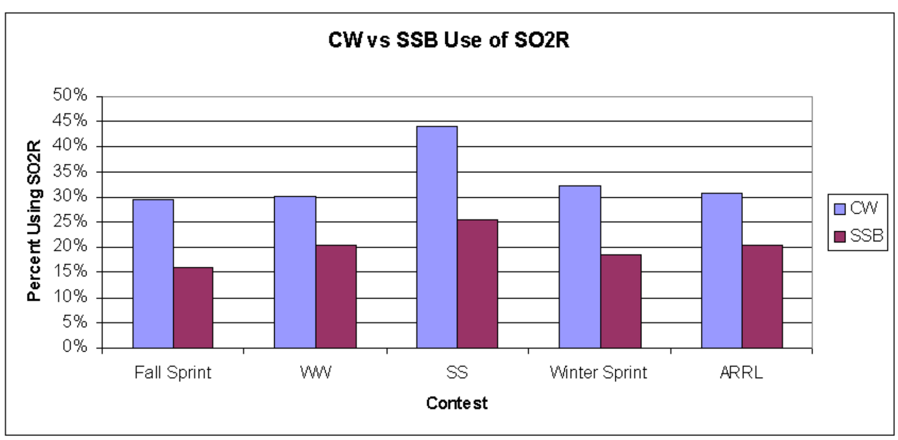


Figure 3— SO2R is clearly more common in the CW contests by more than a two-to-one margin.

use SO2R, 26% some of the time and 19% in every contest. Looking at the individual contests in Figure 2, the average among all contests is that SO2R is used 28% of the time. It's most common in SS CW and least common in the Fall SSB Sprint. Looking at the difference between modes, Figure 3 shows that SO2R is clearly more common in the CW contests by more than a two-to-one margin.

SO2R in the Top Ten

So much for overall averages—who's actually winning the contests? To get an idea of the answer to that question, I sorted the top twenty SOAB-HP and top ten SOAB-LP scores (there are more competitive HP scores than LP scores) for all ten contests. Figures 4a–4d show a sample of the CW and SSB results for a domestic and a DX contest—Sweepstakes and CQ WW. These are typical of the 2R versus 1R distribution in the remaining contests.

In the CW HP category, SO2R dominates. In CW SS, in which 44% used SO2R overall, only two of the top twenty scores were not 2R stations and one of those was from a station for which I could not get data. The LP scores show much the same distribution, as does CQ WW CW for both HP and LP.

Phone is another story entirely. In the phone results for both SS and CQ WW SSB, 2R is about even with 1R except for LP in WW where only one 2R score made the top ten. This pattern holds generally for all ten contests.

Seen another way, Figures 5a through 5d show the top 40 HP scores from the same contests. These are the most competitive operators in North America.

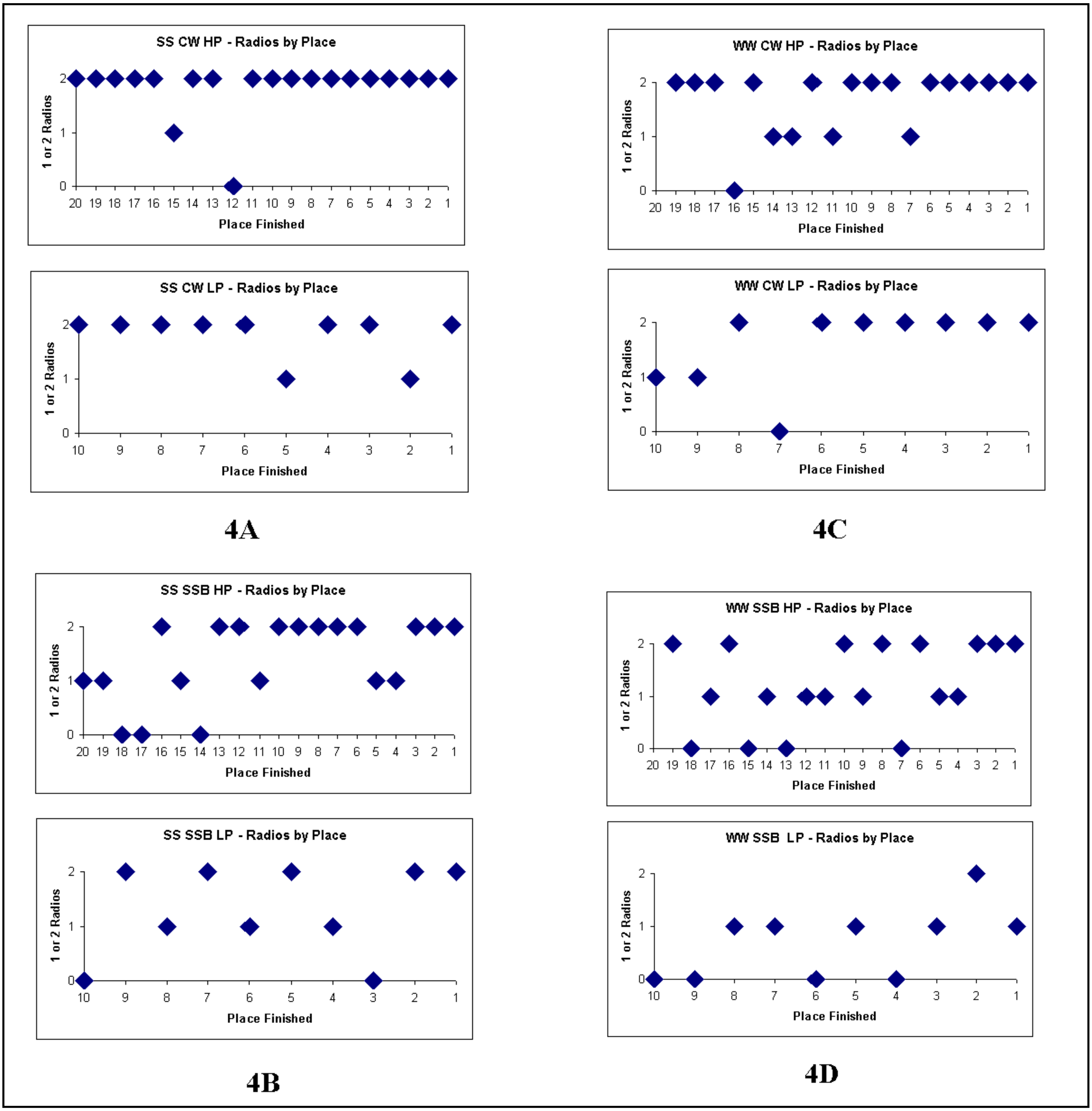


Figure 4 (A-D)—Samples of the CW and SSB results for a domestic and a DX contest—Sweepstakes and CQ WW. These are typical of the 2R versus 1R distribution in the remaining contests.

SO2R is obviously dominating the top scores on CW and is a strong presence on phone. In fact, of the ten contests for which I collected data, only one HP category was won by a 1R effort and in LP only three, regardless of mode. SO2R accounts for 52% of all top scores.

Should SO2R Be a Separate Category?

To answer the question about category, one has to dig a little deeper. The most obvious category separation is that of HP versus LP. There is an unquestioned advantage conferred by power. Does 2R compare to 1R in the same way as for high and low power?

Figure 6 shows the distribution of the top twenty HP and LP scores in the ARRL DX and SS contests. (I would have used CQ WW instead of ARRL DX, but I had the latter data in a spreadsheet already and was out of time to type in data.) Even

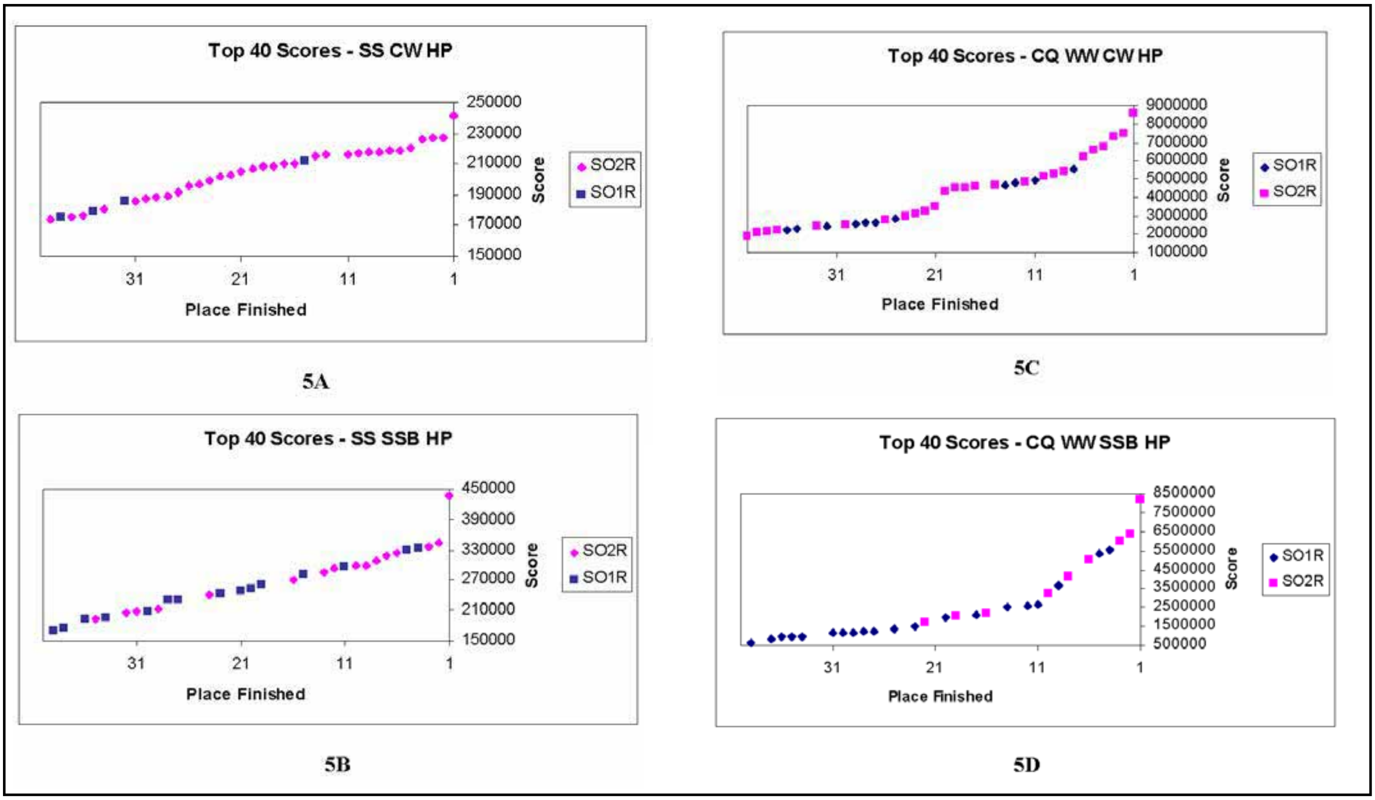


Figure 5 (A-D)—The top 40 HP scores from Sweepstakes and CQ WW.

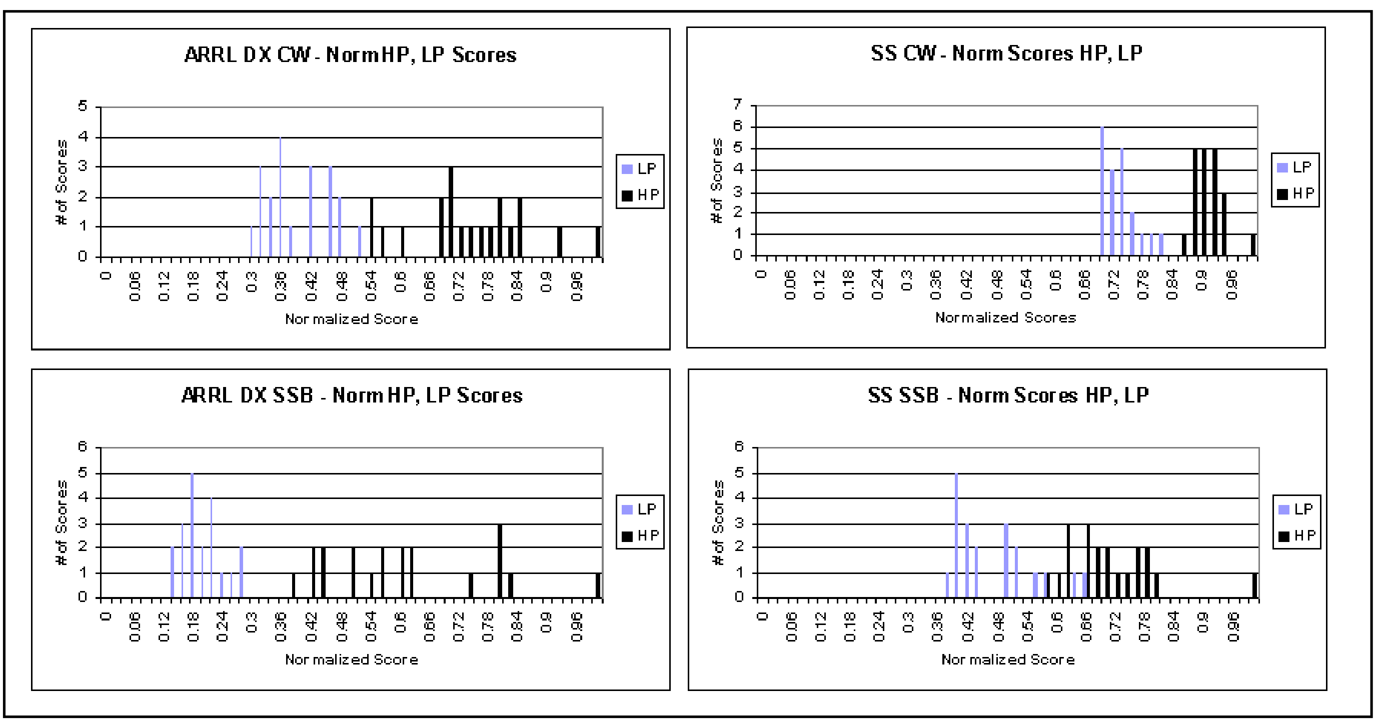


Figure 6—The distribution of the top twenty HP and LP scores in the ARRL DX and SS contests.

for both narrow and broad distributions of scores, in only one case (SS SSB) does a LP score sneak into the range of the top twenty HP scores.

In my opinion, for 2R operation to be considered a separate category, the 1R and 2R scores should show a similar separation to those of the existing pair of categories, HP versus LP. In addition, 2R should be an advantage regardless of mode or power level. Neither of these is apparent in the limited data set that I have analyzed, although it is clear that if you want to be competitive in HP CW you had better be using a second radio.

There are other mechanisms at work in the data that suggest alternate factors contributing to the distributions. The HP and LP categories tend to attract a different type of operator and require different operating styles. The second radio is much more useful if the station called has a high probability of coming back on the first or second call — something much less likely on LP than HP. Smoothly integrating the second radio is much more difficult on phone than for CW because the timing of QSOs makes it much harder to interleave operations efficiently. More of a CW QSO can be automated leaving more "brain space" available to pay attention to the second radio.

Even so, use of the second radio appears to be more of a technology trend than a true category difference. Much the same as the adoption of computer logging and electronic keyers, those "skilled in the art" began making rapid inroads to the top scores with the new gadgetry. Yes, it cost money, time, and materials to integrate computers into the shack back in the late-80's, for instance, but the top operators did so and today it is a rare top score that is done with pencil and paper. (Note that N6KT and K7SS both hold serious records and log exclusively on paper, so exceptional operating skill still carries the day.)

Where to go from here? Perhaps someone in Europe will take the next step and analyze scores from the continental operators. It would also be interesting to see how many of the operators from truly rare, always-in-demand QTHs are using a second radio. Similarly, does the second radio make much of a difference from the DX side in targeted coverage contests like ARRL DX?

Will SO2R eventually be as ubiquitous as computer logging has come to be? I don't think so because of the extra effort it requires. That's not to say that even casual use of a second radio won't become very popular, particularly if manufacturers begin to include a fully functional, separate band receiver in a single radio. The software-defined radio architectures don't place a limit on the number of channels that can be received simultaneously— can SO*n*R be far off? NCJ

By Carl Luetzelschwab, K9LA

Effective Sunspot Number—SSN_e

Remember the September/October 2001 "Propagation" column? It was about working VS6DO early in the morning on 10-meter long path in October 1986 when I was living in the Dallas/Ft Worth area. A check of solar cycle data showed that the solar minimum between Cycle 21 and Cycle 22 was in September of 1986. That said the smoothed sunspot number must have been pretty darn low in October. Indeed, it was officially reported to be 13.

Plugging this into a propagation prediction program set up for K9LA/5 to VS6 (now VR2) on the long path in October of 1986 said 10 meters shouldn't have been open—by a long shot. What allowed this QSO to happen was some "higher than normal" activity by the Sun around the time of the QSO.

I reviewed the daily sunspot number around the QSO date, and saw that indeed something unusual was happening. I estimated that the sunspot numbers around the VS6 QSO date averaged around 50. Plugging that into my propagation prediction program said the QSO could have happened. That certainly is reassuring.

The problem with the official smoothed sunspot number is that it's a heavily averaged calculation—it uses 13 months of monthly mean sunspot numbers to come up with the official smoothed sunspot number for one specific month. That translates to losing sight of the short-term variations in solar activity — the variations that can impact our contest activities. In other words, short-term variations are "smoothed out."

What we need is an indicator of "unusual" solar activity. It needs to be something that we can plug into our prediction programs and, more importantly, something that has a sound scientific background in relation to what's happening with the ionosphere. That indicator is the effective sunspot number, SSN_e.

Understanding SSN_e

SSN_e came to life in the early 1970s, and was developed by the US Air Force Global Weather Central organization. In a nutshell, what SSN_e does is force predicted foF2 values to agree with actual foF2 ionosonde data.

As an example, let's assume my propagation program predicts a monthly median maximum usable frequency (MUF) of 21.0MHz at a smoothed sunspot number of 110 on a desired path at a given date and time. Even with the daily variation of the ionosphere thrown in, 10 meters is not very likely to be open. For a 3000km hop, the vertical incident F2 region critical frequency (foF2) would be about one-third the MUF, which puts the predicted foF2 around 7.0MHz.

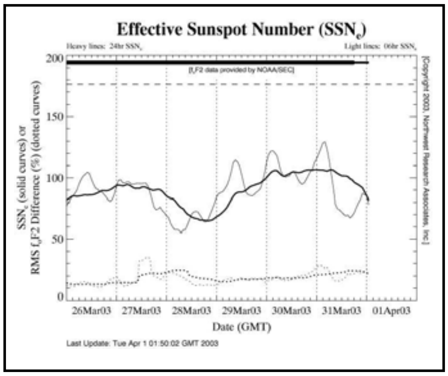


Figure 1—SSN_e from the NWRA Web site.

Now let's get the foF2 ionosonde data along the desired path at the given date and time. Let's assume it says foF2 was actually 9.0MHz. The MUF would now be about 27.0MHz, and it says 10 meters deserves some serious consideration. Note that this comes from "real-time" data, not a prediction.

So all we need to do is determine what sunspot number would force the predicted foF2 of 7.0MHz to move up to the actual foF2 of 9.0MHz. For this example, that turns out to be a sunspot number of around 160. Thus the effective sunspot number, SSN_e, would be 160. This is what you could use in your propagation software to improve your predictions on the higher frequencies (more about this later).

You can get SSN_e at the NorthWest Research Associates (NWRA) web site at **www.nwra-az.com/spawx/ssne24.html**. Figure 1 shows a typical plot.

I suggest using the dark black solid line, which is a 24-hour SSN_e calculation. There is also a light black solid line—it's a running 6-hour calculation. You can read more about SSN_e and the calculations at the NWRA Web site.

And of course, you don't have to worry about converting foF2s to MUFs. Our prediction software works all that out with our input of the smoothed sunspot number, and gives us MUFs.

Caveats

A couple caveats are in order. First, although SSN_e is calculated on an hourly basis, it is not intended to be an indicator of which days are good and which days are bad (i.e., trying to predict the day-to-day variation of the ionosphere). SSN_e is a *best fit* of foF2 data from *many* ionosondes around the world, not just one as in my simple illustrative example. Thus, SSN_e may not represent the true daily variation of the ionosphere along a specific path. As a side note, the Ionospheric Prediction Service (IPS) in Australia calculates a very similar indicator called the T Index (named for Jack Turner, the guy who came up with it). You can view the T Index at **www.ips.gov.au**. Then click on "HF Systems" at the top. Then click on "T Index" under "Global HF" on the left. Then click on "Monthly T Indices." These are smoothed T Indices (12-month running average)—just like the smoothed sunspot number.

Second, SSN_e only addresses the F2 region critical frequency (as does the T Index). It ignores D and E region effects, and thus it is best used for helping with predictions on the higher frequencies, where the D and E region have minimal impact. In other words, don't expect SSN_e to help with predictions on the lower frequencies.

With those caveats in mind, SSN_e should help your propagation predictions and subsequent contesting efforts on the higher bands as Cycle 23 winds down. Since it is derived from "real time" foF2 data, it should also reflect the impact of geomagnetic storms on the F region (but remember it's a worldwide fit of data, and thus it may not fully show what's happening on a specific path). In summary, SSN_e may allow you to catch some of those unusual openings or better understand why conditions were so poor compared to using the predicted smoothed sunspot number. NCJ

Contest Tips, Tricks & Techniques

By Gary Sutcliffe, W9XT

Unusual Antennas and Equipment–Part Two

Hams like to experiment, and in the last issue we covered some of the more unusual antennas and equipment used by contesters. There was such a good response to this topic that we needed to go to two installments.

For the last four years N4BP and K7RE have teamed up to operate the ARRL DX CW contests from the Bahamas. They generally operate the WARC and higher bands to warm up before the contest, but then do individual single op efforts on 40 and 80. As is often the case for contest DXpeditions, they need to bring along their antennas, which for them are made from #24 insulated hookup wire.

The wire is wound around VCR tape cases for storage and traveling. The 40-meter antenna is a 33-foot length of wire supported from a mast with two additional 33-foot wires as radials. The 80-meter antenna is a dipole.

For supports they use DK9SQ masts. They have custom-made supports for the masts that go into two bathroom vent pipes on the roof. Hopefully they are not airtight! Because of the weight limitations of the masts, the 80-meter dipole uses RG174 coax. On Sunday afternoon they used it on 10, 15 and 20 meters with an IC-706 transceiver and tuner. Despite the losses of the thin RG174 coax, they still made over 500 contacts.

On his 1996 CQWW CW DXpedition to Equatorial Guinea with N5AW, N6ZZ used a pair of 40- and 80-meter dipoles on top of a 10-story hotel fed by a single run of coax. The problem was that they didn't have any more coax left over for an antenna for 160 meters. They shorted the end of the coax and shoved it into the center of the SO239 jack on the amplifier. It loaded up well enough to make a number of contacts, including some into the United States.

Sometimes a big beam and tall tower is *not* the way to generate a big score. A number of years ago K9UQN's local club sponsored a local VHF contest. In order to level the playing field for the beginners with modest stations, the scoring system gave an advantage to lower gain antennas and lower antenna height. Don and a friend analyzed the rules and figured that the lower the gain and lower the antenna, the larger the score. They used a dummy load two feet below ground level in the basement. Based on antenna gain and height, one contact was good enough for a score of about 1.5 million points. Unfortunately the rules committee did not award them the win even though they did follow the rules.

Sometimes Size Matters

Sometimes bigger is better. How about a full wave 160-meter loop? That is just what K4WI put up. Cort was not satisfied with the bandwidth of the inverted Vs and slopers. On a whim he laid out 550 feet of electric fence wire and hung it from a pulley at the 90-foot level about 6 feet from one of the towers. One corner went out several hundred feet in a pasture to a pulley next to a tree. The short leg came down next to the house. The bottom was only about 6 feet off the ground, just out of reach of the cows.

The resonant frequency was about 1500 kHz. Removing about 25 feet of wire raised resonance to 1850 kHz. A 4:1 balun brought the 3:1 SWR down to less than 2:1 over 1800 to 1900 kHz. Cort says this is a killer transmit antenna, but not so good for receive. Still it was good enough for a #5 finish in the world in the 1996 CQ 160 SSB low power category.

In his quest for a broadband antenna for 80 meters, W1WEF uses a dipole cut for 3650 KHz. The feed point is fed with a quarter wavelength of 75 Ω coax. Jack used CATV RG11 because it is lightweight. Any length of 50-Ω coax can be used to feed the end of the 75-Ω section. Jack reports an SWR under 2:1 from 3500 to 3800 kHz.

Early CW Keyers

The last installment of CTT&T mentioned early voice keyers by N6XI and K9KM made from loops of recording tape on reel-to-reel tape recorders. Pete, W0RTT, reports on an early CW CQ machine he had. The heart of the machine was a clear plastic disk rotated by a small timer motor. The disk had black marks made with crayon to break the beam of a light/photocell combination. This keyed a Heath DX-60. Pete reports the biggest problem was spacing the dark areas to the appropriate speed. He only used it once, in the 1959 ARRL Novice Roundup as KN9PDH.

Dealing with Antenna Restrictions

K0PG has some severe antenna restrictions. At night Tim can sneak a mobile whip out on the third floor balcony, but during the 2002 ARRL 10 Meter Contest he wanted to get on during the day. He touched the center conductor of the coax to the aluminum frame of the sliding glass door to the balcony. The signals came up out of the noise. He had his wife Pat, K9ILT, hold the connector on the doorframe while he made 22 contacts all over North America and the Caribbean while running 5 W. Did this put him in the multi-op category? Since then Tim has improved the antenna by installing an SO-239 at the base of the frame and adding an 8-foot ground wire along the floor.

WN9O operated the ARRL DX Phone contest from a villa located 1/2 mile away from the coast in Jamaica. In the past Kevin used a trap vertical but was disappointed with its performance. This year they used a TA-33Jr triband beam mounted so the elements were vertical. The ends of the elements were only about 1 foot above the ground. Kevin reports a 2-3 S-unit improvement over the vertical into W9-land.

Chip, K7JA, recently gave a talk on portable operating at the Badger Contesters banquet. In a similar situation, one of the pictures in his presentation shows Chip operating with his FT-817 and a 2-element vertically mounted Yagi overlooking the Pacific Ocean. Chip reported that vertical Yagis are very effective near the ocean.

N9IJ has also been interested in QRP portable operating, including contesting. Len uses his FT-817 and tries different antennas on his travels. One is a trapped dipole built on PVC with a six-foot Radio Shack telescopic whip on each end. He uses an aluminum telescopic painter's pole to get the antenna to 12 feet. The pole has one galvanized tent stake with a hose clamp at the base and uses three more for guy anchors. The entire antenna and pole was less than $30 and works quite well.

That wraps up this two-part series on unusual antennas and equipment. Thanks as usual to the contributors on this subject, including K1TTT, K2SZ, K3FT, K4WI, K6IF, K6LL, K9KM, K9UQN, K0PG, N1UR, N4BP, N4OGW, N6TR, N6XI, N6ZZ, N9IJ, W1WEF, W0RTT, W0UN and WN9O. My apologies if you sent something in that did not make it in the columns. My e-mail mailbox became corrupted and I suspect some of the replies were lost.

Topic For Sept-October 2003 (Deadline July 10): Fall Station Maintenance Tips

What station maintenance do you perform each year? What tricks have you found to make the task quicker or easier? What special things have you done to reduce the need for maintenance?

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**. Be sure to get them to me by the deadline.

VHF-UHF Contesting!

Jon K. Jones, N0JK
n0jk@hotmail.com

W3ZZ's Contesting Article and Comments

Tom Carney, KE6FI posted a note on the VHF Contesting Reflector (**lists.contesting.com/pipermail/vhfcontesting/**) commenting on Gene W3ZZ's lead in the "World Above 50 MHz" column in the April 2003 issue of *QST*. Tom's post and comments to it ignited and stirred up the normally placid VHF Contest reflector. I would highly recommend going back and reading Gene's article. And I would take some time, grab a "cold one" and go to the VHF Contest Reflector archives and read the commentary and discussions yourself.

Here are some of my thoughts on issues I found relevant.

Decline In Logs Submitted = Decline In Contest Activity?

There is no question there has been a significant decline in logs submitted. But has "contest activity" also declined? Prior to 1996, the top QSO totals reported on 6 meters were around 975. In 1996 W5KFT was the first station to break the mythical "1 K" barrier on 6 meters.

In 1998 more stations broke the 1,000 QSOs:

1,358 W5KFT
1,212 N5HHS
1,090 W5UWB
1,066 W1XE
1,031 K0GU
1,009 W8CM

George, K5TR notes: "The interesting thing to me about this is that I think the (E_s) opening in 1996 was much better than 1998 but by 1998 there were more people on the band (6 meters)." I agree with George and posted, "My conclusion is the higher QSO totals in 1998 reflect more 6-meter stations on the air and available to work in that contest. Not that W5KFT made almost 400 more Qs on 6 meters in 1998 than WB0DRL did in 1992." 1992 was an extremely good year for 6-meter E_s, with openings to Japan, KL7, and Europe. And 1987 is regarded as probably the best June VHF QSO Party for E_s in the last 30 years—yet no one in 1987 topped 1000 QSOs. Curt Roseman, K9AKS, feels the "increasing number of HF rigs with 6-meter capability is the primary factor" for the higher QSO totals. "However, increased rover activity might account for some of the increase of QSOs."

So, the top stations are making more contacts on 6 meters and this is most likely due to more 6-meter rigs (and stations) being on the air in the contests. So "activity" (at least on 6 meters) is actually higher. What has happened to the log submissions?

There is no easy answer to this one. Perhaps the answer is to consider why a casual operator would want to send in a log.

Some reasons are club participation and "seeing your call in *QST*." Now that the line results no longer appear in *QST*, that reason is gone. It's not quite the same seeing it on a Web page. Dave K8CC observed "With the ARRL cutting down the contest write-ups in *QST*, with fewer (if any) boxes for top grids and QSOs, these people don't get much satisfaction in digging through piles of scores in the Web results database."

The ARRL VHF Contests Are "De Facto Microwave"

This statement from W3ZZ's article drew many comments and flames. Many commentators agreed with this, some supporting and others deriding it. I believe it is true if you want a high score in many parts of the country. In New England, for example, no matter how well a station did on 50, 144 and 432 MHz, a station having microwave capability would still beat it soundly. The ARRL set up the scoring so microwave QSOs earn more points than those taking place on the lower UHF/VHF bands. This was done in part to encourage activity on microwaves. Nothing wrong with that—microwave operating is a very interesting aspect of radio.

This column has tended to focus more on 6 and 2 meters, particularly 6 meters due to the recent extraordinary solar cycle. I hope to highlight microwave and EME contest aspects in the future. (I hold VUCC on 1296 MHz and have worked Greenland [OX2K] via 1296 MHz EME.) However, many ops with only 6 and 2 meters see that they have no chance of winning or even scoring high due to the contest rules awarding a bonus for microwaves. Now that off-the-shelf microwave stations can be purchased all the way to 10 GHz, is it time for the point bonus for microwave contacts to be reduced?

Others propose a lower-4-band VHF/UHF contest. The CQ VHF Contest is set up in such a fashion. Others argue that many microwave skeds are set up from working stations on 50, 144 or 432 MHz. Stations with 11 bands still have to spend considerable time on 6 and 2 meters to achieve a good score as well as set up microwave band skeds. Microwave activity might dry up if the major VHF contests are only the four lower bands. Currently the ARRL does recognize the top scores in each section on 50, 144, 222 and 432 MHz separately as well as the microwave bands.

VHF Contests Are "Too Long"

Don't even go there! I feel they are too short as is. The longer the contest—to a reasonable point—the more chances of catching E_s, tropo or other exotic propagation.

Robot/Cabrillo Logs Are Too Difficult To Deal With

The Cabrillo format is a hassle for some of the older logging programs. There are Internet resources for dealing with this, as well as free logging programs that are compatible with Cabrillo. You can still send in a paper log.

Rover Rules

This is a real hot potato! Read the VHF Contest reflector comments on this one. I do know that out here in the black hole, rover activity dropped significantly with the rule changes. Particularly the serious multi-band rovers who ran 15-20 grids during the contest weekend.

VHF Contests Are "Boring"

That can certainly be true at times. But a big E_s or F2 opening on 6 meters, aurora on 144 through 903 MHz or a 1000+ mile tropo opening going all the way to 10 GHz can change that in a hurry. Some of the low-band contests can get boring at times, even the big ones like the CQ WW. What is boring to one person is not to another. Some of it is attitude and perspective.

New Operator Classes

This was suggested as one way to encourage log submissions. Bill, K1DY, offered "a few new well-thought-out entry categories are probably a good idea, but let's not make a category for every single entry so everyone gets a prize." Go read the VHF Contest Reflector archives. Lots of food for thought and discussion can be found there. What impressed me probably the most is that a lot of people still care deeply about VHF contesting.

The May 50 MHz Spring Sprint

Conditions were up in the 50 MHz

Spring Sprint this year compared to 2002. Ken, WM5R, operated at K5TR and posted a great score:

Date: 10-11 May 2003
Call: K5TR
Operator: WM5R
Station: K5TR
Class: SOHP
QTH: South Texas (STX)

Summary:

Band	CW Qs	Phone Qs	Grids
50MHz	0	310	103
Total:	0	310	103

Claimed Score: 31,724

He made *117 QSOs* in the last hour of the Sprint. Amazing! George, K5TR, told me in the 2002 Sprint he made only 12 QSOs total. I made 12 QSOs in 9 grids this year with 10 W. Conditions this year really favored the South Texas stations. I had about 2 hours of E_s, but only to south Florida, south Texas and New Mexico. Thus only 12 contacts. Beaming across the same E_s clouds, Ken was able to work further north into higher populated areas. Here are his top 10 Grids on E_s:

1.	em95	15
2.	el96	9
3.	en52	9
4.	en34	9
5.	em86	8
6.	em75	8
7.	em83	7
8.	em74	7
9.	el98	6
10.	em94	6

Ken says, "The band was open to somewhere the entire four hours of the contest. Early on, the band was open to Florida and then Georgia, the Carolinas, and into Virginia. That opening began to fade in the way it built, with Florida stations being the tail end of that opening around 0130 UTC. Around 0200, the band began to open up to Colorado and then Minnesota, and then *boom* all over W0, W8, W9, and VE3. The opening was going strong right up to the end."

For us in the Midwest, there was a short aurora opening around 0120 UTC to Nebraska, Iowa, Minnesota and Wisconsin. Interestingly, the E_s dried up while the aurora was strongest and reappeared near the end of the Sprint as the aurora waned. This contest showed dramatically how the location of E_s clouds can affect QSO totals and scores. See the *NCJ* Web site for a grid map of the stations that K0HA and N0JK heard and worked in this event.

A comment appeared on the VHF Contest Reflector saying a "newbie with some cheap coax and wire in a tree" would not be able to make contacts in a VHF Contest. I ran 10 W to a dipole antenna in the attic and made 12 QSOs under contest conditions. I may have done better with some "wire in a tree!" I hope the good conditions in the 2003 May 50 MHz Spring Sprint predict great band openings in the June VHF QSO Party. NCJ

RTTY Contesting

John Fleming, WA9ALS

Contesting On the Go–Combining Work with Pleasure

You *can* take it with you! Nick Smith, W4GKM, is a charter pilot, and he dreamed of RTTY adventures in foreign lands. In January he embarked on a 10-day cruise in the Caribbean and South America. Unfortunately, all of the amateur equipment he had packed was lost by the airlines on the way to Ft Lauderdale, and only his personal luggage made it to the ship. The radios and antennas were finally found, but not until he returned to the US mainland! Nick thus learned a valuable lesson when DXpeditioning–carry on your equipment if at all possible!

Equipment at HR/W4GKM.

Nick Smith, W4GKM.

Then in March, Nick got a second chance, albeit with short notice. His dispatcher called with 48 hours' notice for a trip to Honduras. Unbelievably, the Honduran Telecommunications Office told Nick that they would have the appropriate license waiting for him when he checked into his hotel—now, that's service! This time Nick wisely packed his equipment in carry-on bags, including a TS-450S, PK-232MBX, MFJ-941C tuner, a Windom antenna, feedline, soldering gun and some PL-259s. Unfortunately, his laptop was kaput, so he had to make a run to the local office supply store for a new laptop and a USB serial adapter. As if this 48-hour short-notice preparation wasn't challenging enough, Nick also had to take a 4-hour course on terrorism!

Since 9/11, pilots have to clear outbound as well as inbound Customs, but Nick had no problems with the gear. He had a nice flight in the Learjet from Nashville, to Mobile, and finally to Tegucigalpa, Honduras. Nick greased the Lear onto the runway surrounded by mountains and quickly made it through Customs. He checked into the Intercontinental Hotel and started pondering how he would cope with his limited equipment. At his disposal at home, Nick is used to having 3 radios, 11 antennas, 2 amplifiers, and 3 computers. However, he was determined to operate the BARTG Spring HF RTTY contest using his new call sign, HR/W4GKM!

The next big break was finding a cooperative hotel manager who asked his maintenance person to help Nick find a suitable place to string the Windom. The hotel windows opened from the inside, so they were in business. Aside from some ambient noise from an outside wedding party and some RFI, Nick was finally ready for some contesting from HR! Nick used *WriteLog* for *Windows* and soon learned how much fun it is to contest with a DX call sign. Even with 50 W and a wire antenna, he was in demand!

Trips to foreign lands always offer some interesting off-the-air excursions. Nick knew he wasn't in Nashville any longer when the first restaurant he visited had a large sign that read: No Guns Allowed.

After the BARTG contest from Honduras, Nick left for a 5-day jaunt to Nassau, where he was already licensed. There was no contest going on at the time (who says there are too many contests?), but he still enjoyed operating as DX.

Nick's experiences reminded me somewhat of my trip to North Caicos for the 2001 RTTY Roundup. You don't have to be a big gun to have fun as DX–just desire and determination. Planning is highly desirable, of course, but Nick has shown us what can be done with just 48 hours notice!

Nick's story also relates to my recent mobile RTTY operating. Of course you can't drive to a rare island, but you can sure drive to a rare RTTY state. In certain contests, rare RTTY states can be as much in demand as DX. Think about it the next time you step into your vehicle!

Dayton 2003

Weather notwithstanding, the Dayton Hamfest (officially known as Hamvention–*Ed.*) again sported a great RTTY Forum and RTTY dinner. Well over one hundred RTTYers attended the forum where George, W1ZT, Don, AA5AU and Jay, WS7I, offered their "Top Ten" for getting more Qs in a contest. "Preparation" was near the top on all three lists, and of course, #1 on Don's list was "Two Radios!" Saturday culminated in the RTTY dinner, again with increased attendance and lots of new faces, including DX. After many door prizes were won and numerous plaques were awarded from this year's *CQ/NRJ* WW DX RTTY and *CQ/NRJ* WPX RTTY contests, we heard about licensing challenges in Mauritius. As always, it's a great experience to eyeball those who have previously only printed on your screen!

PSK63—The Death of RTTY?

A new digital mode has appeared that might interest RTTY ops. Read about PSK63 at **www.qsl.net/kh6ty/psk63/**. PSK31 has met with limited popularity for contesting. Criticism ranges from "too slow" and "too difficult to tune." PSK63 offers certain advantages, including 100 WPM character speed and only half the bandwidth of RTTY. However, Don, AA5AU, has already noted that PSK63 is "too fast" to be practical for contesting. There is simply not enough time to tune the signal to get adequate print when trolling the band. Experienced RTTY ops can tune into the mid-portion of a transmission and still catch the call sign at the end. Imagine SO2R at 100 WPM. These and other observations have made for lively discussions of late on the RTTY reflector (**lists.contesting.com/_rtty/**).

Is PSK63 the "death of RTTY"? I don't think so! This prediction has been offered before–eg, with the advent of PSK31. However, RTTY has proven over and over again that it remains the digital contesting mode of choice. Regardless, it will be helpful to innovators in the contesting community for experienced RTTY operators to explore this new mode and offer input—any weekend there's not a RTTY contest, of course! NCJ

Contesting for Fun

Brian Kassel, K7RE
k7re@arrl.net

Field Day Memories—I Feel Your Pain

By now, the 2003 Field Day memories have been filed away for future reminiscing. The bug bites and poison ivy skin blemishes have cleared up. Even those bruised knuckles that incurred from slipping off those beam boom-mount nuts are almost healed. It sure was fun though, wasn't it? Of course, technically the ARRL Field Day is not a contest. Many operators are pretty competitive though, or at least try to be. Whether you placed high in the standings or not, if you are old enough to remember when TV was all black and white, I bet you can remember just how much work and pain Field Day was in the days of tubes and generators. Yes, I do eminently qualify for that age group. Arriving at age 58 had a lot more to do with my parents' genes than good clean living in my earlier years. Hey, it was the '60s after all!

I wonder if some of our newer hams really know, or at least partly understand, just how much easier Field Day, or any field operating today versus, say 50 years ago. There might be some argument here, but I really am convinced that because Field Day is indeed so much easier than it was a golden age ago, it has got to be a lot more fun. Fun is what this column and Amateur Radio is supposed to be about.

I Speak From Age…I Mean Experience

Now, if you have participated in only a few Field Days I am sure that you have at least one yarn to spin. More years, more yarns. Bear with me while I relate just one of mine.

Let's recap just what a typical Field Day might be like, back in the Dark Ages of the 1960s. First, all of the equipment was tube operated. There were a few transceivers on the market, but many hams still used separate transmitters and receivers. To make a 100-W signal on CW, it would take at least 50 pounds of transmitter. Then, of course, the receiver would weigh in at maybe one half to two thirds that weight.

There was one keyer available at that time, called the TO keyer, and it was made of, yes, tubes. The TO keyer was a Hallicrafters product, a big name back then in radio gear. It had no memory—every exchange had to be manually sent. Some folks had bug keys, too. At least they mechanically produced dots automatically, but the spacing between characters, dashes, etc, would have to be made manually. Operators tended to disagree about how these characters should sound, hence lots of very distinctive fists were heard. Counting the keyer, the typical rig would weigh well over 100 pounds, once all of the accessories were added.

Duping? Well, the PC was still decades away. Most operators used a second operator at each position. The "duper" had to be as proficient as the operator because it was his/her responsibility to ensure that the current QSO was not a dupe. Your total QSOs were cut in half with twice as many operators required per each position. Lots of clever schemes evolved to handle this chore, and all involved some sort of large piece of paper. Columns and rows were arranged in such a way that each call sign was broken out.

That "dupe sheet," as it was called, not only recorded call signs that were worked, it also provided a visual record of each meal, snack, beer, insect repellant application and rain storm. Each was automatically archived as well as various stains of completely unknown origin. The log sheet, also manually compiled, was just as telling. The beer-fatigue product was proportional to the incomprehensibility of each log entry.

The Great White Behemoth. Thar She Blows!

And then there was the generator. I know that there are still a few Field Day groups who depend on this piece of machinery. I have to admit, this piece of gear is the one that I miss the least. There are many generators that I have learned to hate. On more than one occasion, these noisy, smelly, smoke-belching machines have been my main Field Day nemesis. For some reason, we always seemed to press into service the largest behemoth that we could locate.

I remember one particular year when I was invited to go out on Field Day with the Collins Radio group in Richardson, Texas. I had been offered the use of a 50 kW diesel machine from the company that I worked for at that time. It had tandem axles, 4 wheels, and, of course, was huge. The pickup truck I had borrowed had the wrong-sized hitch to boot, but I didn't realize that until well into the trip to the Field Day site. I towed that monster down a twisty road at 45 MPH. Then it happened. The generator, which probably weighed somewhat more than the pickup, began to oscillate from side to side. Thank goodness there were no other vehicles around. In an instant, I was all over the road, over into the field, back across the road, on the other side of the road and into an adjacent field. Somehow, I slowed down enough to stabilize the whole mess, but I don't know how it happened. I limped along at 25 MPH and successfully arrived at the site.

We managed to get the whole system up and working. We used jumper cables, ether starting spray, hammers and some well-chosen words out of the Texas dictionary to make it happen. During the night, a few ops complained that the generator noise was too loud, and that we should back the generator down into a low spot in an attempt to muffle the roar.

After the Field Day festivities were over, it was time to hitch that generator back up. Naturally, we discovered that the frame of that huge monster was hung up on a large rock! So, with little sleep, hung over, bug bitten and sunburned, we dug out that piece of…machinery. Hours later I drove the generator back to its home, at 25 MPH. I hurt for a week, and that's when I was actually in some kind of physical shape!

The Pain is Gone, But the Thrill is Still Alive and Well

Every time that I go portable these days, I glance at my gel-cell battery and Elecraft rig, and just for a fleeting instant, the generator episode flashes by in my mind's eye. My Elecraft transceiver and every accessory all weigh well below what just one box from that pile of glass and metal did 50 years ago. The current consumption of the whole station now is less than the filament current in two tubes from that bygone station. My modern portable station sets up in minutes, not hours. My notebook PC does all of my logging, dupe checking and most of my CW sending. Receiver overload from the adjacent Field Day stations at the site is almost nonexistent.

For me, the golden age of field operating is now, not then. The tent is much smaller, leaving lots more room for 807s. What is an 807? I leave it to my more experienced (read: older) readers to explain that to any youngsters who don't comprehend. Well, some terms and practices from the past still do apply today after all.

Burn Your _____ Off, BUBBA

If you still want to try your hand at field contesting, look at the upcoming BUBBA outing in August. This event has been covered before here. Basically, it is a QRP outdoor event where your score is based on QSOs as well as the highest temperature recorded at your operating position during the event. There are no additional points for 807s consumed. You can find out the 2003 date and more details at **www.extremezone.com/~nk7m**. NCJ

Contest Calendar

Compiled by Bruce Horn, WA7BNM

Here's the list of major contests to help you plan your contesting activity through October 2003. The Web version of this calendar is updated more frequently and lists contests for the next 12 months. It can be found at **www.hornucopia.com/contestcal/**.

Please note that the Kentucky QSO Party has been moved to the end of July; the Colombian Independence Day Contest has been discontinued; the DL-DX RTTY Contest is a new RTTY contest in early July; and the Norwegians are celebrating the 75th anniversary of their national society with a contest in late August.

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

July 2003

RAC Canada Day Contest	0000Z-2359Z, Jul 1
MI QRP July 4th CW Sprint	2300Z, Jul 4 to 0300Z, Jul 5
Venezuelan Ind. Day Contest, SSB/CW	0000Z, Jul 5 to 2400Z, Jul 6
DL-DX RTTY Contest	1100Z, Jul 5 to 1059Z, Jul 6
DARC 10-Meter Digital Contest	1100Z-1700Z, Jul 6
IARU HF World Championship	1200Z, Jul 12 to 1200Z, Jul 13
FISTS Summer Sprint	1700Z-2100Z, Jul 12
QRP ARCI Summer Homebrew Sprint	2000Z-2400Z, Jul 13
Pacific 160-Meter Contest	0700Z-2300Z, Jul 19
North American QSO Party, RTTY	1800Z, Jul 19 to 0600Z, Jul 20
CQ Worldwide VHF Contest	1800Z, Jul 19 to 2100Z, Jul 20
CQC Great Colorado Gold Rush	2000Z-2200Z, Jul 20
Russian RTTY WW Contest	0000Z, Jul 26 to 2400Z, Jul 27
Black Sea 2-Meter VHF FM Contest	1100Z, Jul 26 to 1100Z, Jul 27
IOTA Contest	1200Z, Jul 26 to 1200Z, Jul 27
Kentucky QSO Party	1600Z, Jul 26 to 0400Z, Jul 27

August 2003

10-10 International Summer Contest, SSB	0001Z, Aug 2 to 2400Z, Aug 3
European HF Championship	1000Z-2159Z, Aug 2
North American QSO Party, CW	1800Z, Aug 2 to 0600Z, Aug 3
ARRL UHF Contest	1800Z, Aug 2 to 1800Z, Aug 3
SARL HF SSB Contest	1300Z-1600Z, Aug 3
WAE DX Contest, CW	0000Z, Aug 9 to 2359Z, Aug 10
Maryland-DC QSO Party	1600Z, Aug 9 to 0400Z, Aug 10 and 1600Z-2359Z, Aug 10
Six Club Perseids Meteor Shower Contest	2300Z, Aug 12 to 2300Z, Aug 14
SARTG WW RTTY Contest	0000Z-0800Z, Aug 16 and 1600Z-2400Z, Aug 16 and 0800Z-1600Z, Aug 17
ARRL 10 GHz Cumulative Contest	0600 local – 2400 local, Aug 16 and 0600 local – 2400 local, Aug 17
Keyman's Club of Japan Contest	1200Z, Aug 16 to 1200Z, Aug 17
SEANET Contest, CW/SSB/Digital	1200Z, Aug 16 to 1200Z, Aug 17
North American QSO Party, SSB	1800Z, Aug 16 to 0600Z, Aug 17
New Jersey QSO Party	2000Z, Aug 16 to 0700Z, Aug 17 and 1300Z, Aug 17 to 0200Z, Aug 18
ALARA Contest	0600Z, Aug 23 to 1159Z, Aug 24
Hawaii QSO Party	0700Z, Aug 23 to 2200Z, Aug 24
TOEC WW Grid Contest, CW	1200Z, Aug 23 to 1200Z, Aug 24
SCC RTTY Championship	1200Z, Aug 23 to 1159Z, Aug 24
NRRL 75th Anniversary Contest	1200Z, Aug 23 to 1200Z, Aug 24
Ohio QSO Party	1600Z, Aug 23 to 0400Z, Aug 24
SARL HF CW Contest	1300Z-1600Z, Aug 24
CQC Summer QSO Party	1800Z-2359Z, Aug 24
YO DX HF Contest	1200Z, Aug 30 to 1200Z, Aug 31

September 2003

MI QRP Labor Day CW Sprint	2300Z, Sep 1 to 0300Z, Sep 2
All Asian DX Contest, SSB	0000Z, Sep 6 to 2400Z, Sep 7
IARU Region 1 Field Day, SSB	1300Z, Sep 6 to 1300Z, Sep 7
North American Sprint, CW	0000Z-0400Z, Sep 7
DARC 10-Meter Digital Contest	1100Z-1700Z, Sep 7
YLRL Howdy Days	1400Z, Sep 10 to 0200Z, Sep 12
WAE DX Contest, SSB	0000Z, Sep 13 to 2359Z, Sep 14
Louisiana QSO Party	1400Z, Sep 13 to 0200Z, Sep 14 and 1400Z-2000Z, Sep 14
ARRL September VHF QSO Party	1800Z, Sep 13 to 0300Z, Sep 14
North American Sprint, SSB	0000Z-0400Z, Sep 14
FISTS Coast to Coast Contest	0000Z-2400Z, Sep 14
Tennessee QSO Party	1800Z, Sep 14 to 0100Z, Sep 15
QRP ARCI End Summer PSK31 Sprint	2000Z-2400Z, Sep 14
AGB NEMIGA Contest	2100Z-2400Z, Sep 19
ARRL 10 GHz Cumulative Contest	0600-2400 local, Sep 20 and 0600-2400 local, Sep 21
SARL VHF/UHF Contest	1000Z, Sep 20 to 1000Z, Sep 21
Scandinavian Activity Contest, CW	1200Z, Sep 20 to 1200Z, Sep 21
Collegiate QSO Party	1200Z, Sep 20 to 0400Z, Sep 21
QRP Afield	1500Z, Sep 20 to 0300Z, Sep 21
Washington State Salmon Run	1600Z, Sep 20 to 0700Z, Sep 21 and 1600Z-2400Z, Sep 21
Panama Anniversary Contest	1200Z-2359Z, Sep 21
Fall QRP Homebrewer Sprint	0000Z-0400Z, Sep 22
CQ/RJ Worldwide DX Contest, RTTY	0000Z, Sep 27 to 2400Z, Sep 28
Scandinavian Activity Contest, SSB	1200Z, Sep 27 to 1200Z, Sep 28
Texas QSO Party	1400Z, Sep 27 to 0200Z, Sep 28 and 1400Z-2000Z, Sep 28
Alabama QSO Party	1800Z-2400Z, Sep 27

October 2003

SARL 80-Meter QSO Party	1700Z-2000Z, Oct 2
TARA PSK31 Rumble	0000Z-2400Z, Oct 4
Oceania DX Contest, Phone	0800Z, Oct 4 to 0800Z, Oct 5
EU Autumn Sprint, SSB	1500Z-1859Z, Oct 4
California QSO Party	1600Z, Oct 4 to 2200Z, Oct 5
QCWA QSO Party	1800Z, Oct 4 to 1800Z, Oct 5
RSGB 21/28 MHz Contest, SSB	0700Z-1900Z, Oct 5
YLRL Anniversary Party, CW	1400Z, Oct 8 to 0200Z, Oct 10
10-10 Day Sprint	0001Z-2400Z, Oct 10
Oceania DX Contest, CW	0800Z, Oct 11 to 0800Z, Oct 12
EU Autumn Sprint, CW	1500Z-1859Z, Oct 11
Pennsylvania QSO Party	1600Z, Oct 11 to 0500Z, Oct 12 and 1300Z-2200Z, Oct 12
FISTS Fall Sprint	1700Z-2100Z, Oct 11
Iberoamericano Contest	2000Z, Oct 11 to 2000Z, Oct 12
North American Sprint, RTTY	0000Z-0400Z, Oct 12
YLRL Anniversary Party, SSB	1400Z, Oct 15 to 0200Z, Oct 17
JARTS WW RTTY Contest	0000Z, Oct 18 to 2400Z, Oct 19
QRP ARCI Fall QSO Party	1200Z, Oct 18 to 2400Z, Oct 19
Worked All Germany Contest	1500Z, Oct 18 to 1459Z, Oct 19
W/VE Islands QSO Party	1600Z, Oct 18 to 2359Z, Oct 19
Asia-Pacific Sprint, CW	0000Z-0200Z, Oct 19
RSGB 21/28 MHz Contest, CW	0700Z-1900Z, Oct 19
Illinois QSO Party	1800Z, Oct 19 to 0200Z, Oct 20
CQ Worldwide DX Contest, SSB	0000Z, Oct 25 to 2400Z, Oct 26
10-10 International Fall Contest, CW	0001Z, Oct 25 to 2400Z, Oct 26

NCJ

Carl Luetzelschwab, K9LA

Contesters Being Deliberately Jammed

A Contester's View

I operated in the "*fill in the blank*" contest this year, and those who I assume were non-contesters deliberately jammed me. In my opinion, this seems to be happening more and more lately.

I'm trying to be competitive. It's tough enough to have to fight the East Coast (I'm in the Midwest), let alone being deliberately QRMed and ultimately ending up with a reduced score because of the jamming.

I just don't understand why I'm being jammed. Before starting my CQs, I ask if the frequency is clear. If it isn't, I try somewhere else.

I don't run my speech processor too high, so I don't think I'm excessively wide. And I don't operate that much—just the major phone contests: ARRL DX, CQ WPX, IARU, CQ WW, Sweepstakes and the 10-Meter Contest. I've also been known to jump in CQ 160-Meter Phone and NAQP Phone.

These non-contesters have the bands to themselves all week, so why can't they just accept the fact that others would like to use the bands every once in a while on the weekend? Why don't they move to 30, 17 or 12 meters on contest weekends?

A Non-Contester's View

I work during the week, and also do family and community activities in the evenings. So, my only time to really get on and enjoy ham radio is on the weekends.

It used to be that I'd have a problem every once in a while. But it seems to be getting worse lately—like there are more and more contests. Just out of curiosity, I did a Google search on the Web for "Amateur Radio contests." I found a Web site that lists contests by month. I was amazed to see how many contests there are throughout the year—even some weekends with multiple SSB contests.

Forty meters is especially bad. I'll be having an enjoyable QSO with a new ham friend and all of a sudden it seems like hundreds of guys start yelling their call on or very near our frequency. I don't even hear the station they're calling. If we QSY, sooner or later we'll get QRMed again. Contesters just don't seem to care; all that matters is a contest QSO.

I'm tired of fighting it. As the contesters take over the bands more and more on the weekends, I guess I'll try to get on a little during the week in the evenings. Or maybe I'll just quit the hobby altogether.

Can't We All Just Get Along?

This was a hypothetical exchange between a contester and a non-contester about deliberate jamming. The issue of "deliberate jamming" seems to be a problem that is growing.

In early March an interesting thread took place on the secc@contesting.com and cq-contest@contesting.com reflectors (and maybe other reflectors that I'm not aware of). One contester, after ARRL DX Phone, commented that "*I also experienced a lot of intentional QRM this year...things are getting worse,*" and "*it seems that a lot of hams today get wedded to a particular frequency and it's theirs from now on.*"

This generated many other postings, and here are some highlights from subsequent postings:

- *And you want to know what the problem is? It's inconsiderate contesters that dump on top of ongoing conversations. Contesters have a bad name in general. We all need to work towards cleaning up our act a bit.*
- *If you were there first on the frequency, then it is up to them to move to avoid QRM that they believe is being caused by you and/or others calling you.*
- *There really are too many contests. I think the major problem is all the dang CQing going on.*
- *What I love is the nets that believe that being established on a particular frequency entitles them to "ownership" of that same frequency. This means the net will just have to squeeze into a crowded band during a contest and do the best they can.*
- *He said I was deliberately running a signal 20 kHz broad in order to keep my frequency clear.*
- *That's why working S&P in a 40-meter SSB contest is such fun. A Yagi and 1.5 kW will take care of your transmit frequency, and they have no idea where to jam.*
- *Who's the "jammer" is in the eye of the beholder.*
- *Many people have only weekends available for ham radio. We as contesters have to be more considerate and not let our egos get the better of us. Confrontation is not a good idea.*
- *None of our contests use the WARC bands – surely there is lots of contest-free spectrum on almost every weekend.*
- *As for band plans, perhaps it would be a good thing if CONTEST SPONSORS simply MENTIONED that the band plans exist and RECOMMEND that people consider them in their operating schedules.*

Most of the commentators realize that we're not squeaky-clean.

So what do we do about it? I think we should start by trying to take care of our own house. We should consciously adopt some basic contesting etiquette guidelines. The list I put together is not complete; others can probably think of more things we can do to help the situation. If you have other ideas, feel free to drop me an e-mail. And if there's been a similar list published in the past (I seem to remember one, but darned if I can find it now), I'd love to hear about it.

Contesting Etiquette

- If "contest-free zones" are listed in the rules, obey them (regardless of what everyone else is doing). Similarly, obey any band plans that are on the books.
- Check the frequency (for more than 1 millisecond) before CQing.
- If the station you want to work is operating split, check his listening frequency before calling. If there's a QSO on that frequency, don't call. The excuse that "I'll make it quick, so that shouldn't disrupt anything" needs to be multiplied by the number of other contesters thinking the same thing.
- Measure or have a friend monitor the bandwidth of your transmitted signal when it's in the "contest mode." If it's significantly wider than what's generally accepted, fix it. Contests are not an excuse to have poor or excessively wide audio. This applies to key clicks on CW, too (see the key click article elsewhere in this issue). What mucks this up is the performance of our receiver under crowded band conditions with strong signals—it may really be that the non-contester's receiver is the problem, and that needs to be stated politely (admittedly a delicate situation).
- Speaking of polite, always be polite if you get into a delicate situation.
- Strike up a conversation with the "enemy" and ask if he/she would like to join in a multiop contest operation from your QTH. Hey, it doesn't hurt to ask!
- Encourage contesting etiquette among fellow contesters. NCJ

DX Contest Activity Announcements

Bill Feidt, NG3K
bill@ng3k.com

If you want to appear in the September/October issue, the deadline is July 18. You can submit your data using the form you'll find at **www.ng3k.com/Contest/consub.html**. If you prefer to e-mail your information, please include:

- Call sign to be used
- DXCC entity
- CQ Zone (for the CQ WW contests)
- Entry class
- QSL Route
- Your call sign and e-mail address
- Operators and other information of interest

Send your information to **bill@ng3k.com**. You can review what has been received to date at **www.ng3k.com/contest/conasc.html**. This Web page is continually updated as new announcements are received.

RSGB IOTA Contest (July 26-27, 2003)

Call	*Entity*	*IOTA*	*Operators*
5W	Western Samoa	OC-097	DL2AH
9A/HA8KW	Croatia	EU-170	HA8KW
9A0R	Croatia	EU-136	
CY9	St Paul	NA-094	N5VL, N0RN, KO4RR, W4WY
DF3UFW/p	Germany	EU-057	DF3UFW
DF0WLG	Germany	EU-057	DF0WLG
DJ7AO	Germany	EU-128	DJ7AO
DL4OK/p	Germany	EU-042	DL4OK
DL5KUA	Germany	EU-128	DL5KUA
DL0KWH	Germany	EU-129	DL2SWW, DH7NO, DH2AX, DL6ATM, DL2RTK, DH1LA, DL2VFR and others
DP1POL	Antarctica	AN-016	DL5XL
E21EIC/p	Thailand	AS-107	E21EIC
ED1ONS	Spain	EU-080	multinational team
G	England	EU-120	ON5FP, ON4CJK
JW	Svalbard	EU-063	
K9ES	USA	A-141	K9ES
OZ/DF0TX/p	Denmark	EU-125	DF0TX
OZ/DJ1AA/p	Denmark	EU-125	DJ1AA
OZ0J/p	Denmark	EU-088	OZ0J
R1PQ	Russia (Europe)	EU-035	
TM3ON	France	EU-068	ON4ASG, ON4AVA, ON4ON, ON5SY, ON6CX, ON7PQ, ON7XT, ON9CGB
VE2/VE9MY/p	Canada	NA-038	VE9GLF, VE9MY
VE8NET	Canada	NA-129	Western Arctic Amateur Radio Association
WA6WPG/p	USA	NA-144	WA6WPG

Thanks to: 425DXN, 9A6AA, DJ1AA, DL2AH, DL2VFR, DP1POL, E21EIC, K9ES, ON9CGB, OPDX, OZ0J, WA6WPG. See **www.ng3k.com/Misc/iota2003.html** for further details

New Product

HAMIC — The Hamic Intelligent Calculator

SweetScape announces the availability of HAMIC, the Ham Intelligent Calculator. HAMIC is a powerful, yet easy-to-use calculator that can solve simple resistor/capacitor/inductance/impedance circuits in series or parallel, or more complex L, Pi, or T network circuits. The program's interface consists of a graphical circuit. Select the calculation type (i.e. resistor, capacitor, inductor, or impedance), enter two variables, and HAMIC will solve for the remaining variable. With a click of the mouse, the display is changed from series to parallel. HAMIC can also work with advanced network circuits. The program calculates impedance for two types of L-networks and both Pi and T networks (HAMIC can solve L-networks for two variables and thus can be used to design Omega matching networks for antennas).

Results are displayed in the proper units (i.e. Ohms, Henrys, Farads, or Hertz) and can be converted to different orders of magnitude (i.e. mega, milli, kilo, micro, or pico) with the click of a button. Other features include specifying the output precision/significant digits and saving your work to a worksheet for retrieval later.

HAMIC is available for $20 from the SweetScape Web site at **www.sweetscape.com/hamic/.** HAMC will run under *Windows 98/NT/2000/XP*.

Results, February 2003 North American Phone Sprint

By Jim Stevens, K4MA
ssbsprint@ncjweb.com

For the forty-first running of the North American Phone Sprint, 136 logs were received from 40 different areas. The 136 logs received are an all time high for Phone Sprint and included a first-time entry from Nicaragua by Robert, YN1BB. Also, an old Sprint friend, Oms, PY5EG, joined us again for the fun.

Overall, conditions were comparable to the previous February, but scores were down slightly due to less multipliers being on the air. A couple of external events helped to shape this running of the Phone Sprint. First, the Space Shuttle *Columbia* broke up and was destroyed during its attempted landing at the Kennedy Space Center on the morning before the Sprint and, second, the recent death of Mark Obermann's (AG9A) wife, Cathy. As a result, a number of *Columbia* and Mark names were used by Sprinters to commemorate these sad events. And as one of the soapbox comments reads, our thoughts and prayers go out to everyone affected.

High Power

K9PG (operating at WB9Z) easily notched his second North American Phone Sprint win. Paul had 12 more QSOs than his nearest competitor. Paul also boasted the second most multipliers. There was a close battle for second place between the K6Ls. Dave, K6LL, topped Ken, K6LA, by less than 600 points. It was very close through the first two hours with Ken leading by 9 QSOs at 0200Z, but during the last two hours Dave ran away with it, eventually finishing 33 QSOs ahead of Ken. Ken did make it somewhat closer than the 33 QSOs would indicate by picking up 3 more multipliers. Congratulations to W6EU with his first top-ten finish.

Low Power

Winning the low-power category for the first time and turning in the most amazing effort of the contest was N6MJ. Dan not only won low power, but also finished fourth in the overall, high power, standings. He did all of this with *no 80-meter QSOs*. In addition, Dan had the most multipliers in the contest, and he turned in a Golden Log (no penalties). Great job, Dan! Terrific scores were also turned in by K5NZ and N5DO who finished second and third respectively.

QRP

The QRP winner is K7RI operated by K7SS. Danny set a new QRP record with his score and now holds the all-time high score for high power, low power and QRP. KC5R and NA4BW were the QRP second and third place finishers.

Golden Logs

In addition to N6MJ's top QSO Golden Log, VE5SF, K9JS and WQ5L all submitted Golden Logs with 50 or more QSOs. Congratulations! If you want a copy of your log-checking report, please send an e-mail to **ssbsprint@ncjweb.com**.

Records

No new high-power records were set in this Phone Sprint. New low-power area records are: K3MM in Maryland, K5NZ in Texas, N6ZZ in New Mexico, N6MJ in California, K8IA in Arizona, and VY1JA in the Yukon. New QRP records are: NA4BW in Georgia, KC5R in Louisiana, and K7RI (K7SS) in Washington. The Phone Sprint records have been updated on the *NCJ* Web. Check them out at **www.ncjweb.com/ssbsprintrecords.php**.

Top Ten Scores

	Scores	*Band changes*	*QSOs lost*	*00Z*	*01Z*	*02Z*	*03Z*
K9PG (at WB9Z)	18207	93	8	118	78	67	95
K6LL	15870	4	5	101	59	96	89
K6LA	15288	57	3	95	74	67	76
N6MJ	14820	1	0	88	57	68	72
W9RE	14715	38	7	106	76	68	77
W7WA	14490	4	7	97	86	60	72
KW8N	14175	71	7	101	70	52	93
W6EU	13905	2	4	82	69	80	78
WB0O	13717	7	7	114	76	51	79
WD0T (at KD0S)	13104	9	11	96	77	66	76

Team Scores

Dead Lizards CAN Talk

K9PG (at WB9Z)	18207
W9RE	14715
KW8N	14175
WB0O	13717
WD0T (at KD0S)	13104
K9ZO	12306
K0OU	11340
KI9A	9120
K9NW	3451
	110135

NCCC#1

W6EU	13905
AE6Y	12420
W6YX (N6DE)	12013
K6XX	11844
KI7WX (at AI6V)	11660
NI6T	11634
K6LRN	10019
WX5S (at N6RO)	8892
KU6J	7446
W6IXP	6000
	105833

SCCC

K6LL	15870
K6LA	15288
N6MJ	14820
W7WW	10434
W6TK	9594
K6EY	5338
N6RT	4356
K6ZCL	656
WA7BNM	338
	76694

TEAM SO1R

W7WA	14490
K5NZ	11997
N7LOX	11396
N7GYD	10240
W70M	8853
K7RI (K7SS)	8526
W7GTO	1558
	67060

5. *NCCC#2* (N6ZFO, K6EP, N9JIM, AD6E, K6III, K6ENT, ND2T, AD6TF, K6UFO,W6ZZZ): 42259
6. *Mad River Radio Club* (K9TM, ND8DX, K8CC, K8MR): 31274
7. *CADXA* (KN5H, K8IA, W8AEF): 23303
8. *GMCC Team #1* (K0UK, W0ETT, N4VI): 23035
9. *SMC #1* (KE9S, WA9IRV, AA9RT, KC9UM): 19676

Top 10 QRP

K7RI (K7SS)	8526
KC5R	3636
NA4BW	2214

Top 10 Golden Logs (50 or more QSOs)

N6MJ	285
VE5SF	189
K9JS	160
WQ5L	57

Top 10 QSOs	
K9PG(at WB9Z)	357
K6LL	345
W9RE	327
WB0O	319
KW8N	315
W7WA	315
WD0T (at KD0S)	312
K6LA	312
W6EU	309
K9ZO	293
W6YX	293

Top 10 Multipliers	
N6MJ	52
K9PG (at WB9Z)	51
K6LA	49
N5DO	47
W7WW	47
N2NL	47
K6LL	46
W7WA	46
NX9T	46
WT9U	46

Top 10 Band Changes	
K9PG (at WB9Z)	93
KW8N	71
K4MA	66
K6LA	57
K3MM	43
W9RE	38
KT0R	34
WX5S (at N6RO)	18
K7RI (K7SS)	18
K9TM	17

Top 10 Low Power	
N6MJ	14820
K5NZ	11997
N5DO	11468
K7SV	10248
K3MM	9462
W7UQ	8880
K8IA	8120
W0ETT	7056
WF4DD	6630
K9JS	6560

Teams

In the team competition, Dead Lizards CAN Talk picked up another win over second place Northern California Contest Club #1. Third and fourth place teams were Southern California Contest Club and Team SO1R.

The September 2003 North American Phone Sprint will be held at 0000Z on September 14 (September 13 local time). Get on and join the fun!

Soapbox

I'm not normally a big fan of Phone Sprints, but this one was very enjoyable.—AE6Y. Thanks to George, K5TR, for the use of his station.—WM5R. Tried *Writelog* for the first time … thanks for everyone's patience—K6EY. Found it difficult to talk fast and type at the same time.—K6OWL. Sprint is a very challenging contest!—K6ZCL. Very strange aurora-sounding signals from Washington on 40M. Just a part time effort.—K7RAT (N6TR). QRP in a Phone Sprint. Whew!—K7RI (K7SS). Small tribute to the crew of *Columbia* … of which 3 were amateurs.—K9NW. Thanks to Jerry (WB9Z) and Lori for letting me play.—K9PG. Wow! That was fun.—K9ZF. QRP is a backwards acronym for "Please Repeat QSO Info"—KC5R. Our thoughts and prayers are with you, Mark (AG9A).—KG9N. Seemed to be a lack of East Coast guys. Don't you guys like Sprint?—KI9A (Us East Coast guys do get on and beam Europe. Isn't that what you are suppose to do in a contest?—*Ed*). Even though I avoid SSB contests, I got into this one for the club. Worked a few then drank beer, watched TV and then worked some more.—KJ9C. Sprint is a blast!—KT0R. I got on to give out the Iowa multiplier. It seems like Iowa isn't very well represented in the Sprints.—N0AC (Now that is an understatement. Please come back.—*Ed*). Missed 1.5 hours when tenant called with a broken front door knob. What timing.—N4VI. Off times were up on the tower switching coax.—N9JIM. My first sprint. Wow! What a pace!—NK1N. K9PG sent me an e-mail to encourage me to operate. It worked. Sprinters are a unique bunch and I think some of contesting's best ops. I'll try to get on more and give out the MB mult in both modes.—VE4GV (Please!—*Ed*). Most signals were weak and watery.—VY1JA. I found the SSB Sprint to be extremely therapeutic. There is something about desperately shouting into a microphone, and contributing to the chaos, that really appeals to me. I felt much better after the Sprint!—N6DE. First hour had no power to the QTH, used a generator.—WD0T (at KD0S)

Scores

Call	*Name*	*QTH*	*20*	*40*	*80*	*QSO*	*Mlt*	*Score*	*Team*
WB1GQR (W1SJ)	AL	VT	42	83	62	187	36	6732	
K1KD	GRANT	VT	44	69	49	162	37	5994	
AA1UT	*TIM	ME	10	59	14	83	27	2241	
K1HT	*DAVE	MA	16	3	0	19	9	171	
NK1N	GLEN	NY	1	46	0	47	21	987	
KA2BXH	*EB	NJ	0	4	0	4	4	16	
K3MM	*TY	MD	91	95	63	249	38	9462	
K3WW	CHAS	PA	56	4	37	97	30	2910	
NX9T	JEFF	NC	102	103	68	273	46	12558	
K4MA	JIM	NC	99	107	70	276	43	11868	
WD4K (K0EJ)	MARK	TN	78	110	71	259	44	11396	
K4WX	DON	TN	80	106	79	265	43	11395	
N2NL	DAVE	FL	126	107	0	233	47	10951	
NA4K	STEVE	TN	77	101	68	246	44	10824	
K7SV	*LARRY	VA	78	102	64	244	42	10248	
K4NO	GREG	AL	72	100	71	243	39	9477	
W4NZ	TED	TN	74	74	60	208	40	8320	
WF4DD (KG4CZU)	*CHRIS	NC	71	59	40	170	39	6630	
KU8E	*JEFF	GA	40	79	40	159	40	6360	
WW4LL	FRED	GA	70	42	61	173	34	5882	
N4CW	BERT	NC	67	68	0	135	35	4725	
KE4OAR	*CHUCK	TN	46	54	0	100	30	3000	
N2BT	*BILL	NC	0	32	47	79	31	2449	
K4BP	JEFF	TN	47	52	0	99	24	2376	
NA4BW	**BRIAN	GA	51	0	31	82	27	2214	
K4AMC	*JIM	TN	30	33	0	63	21	1323	
N4NTO	*TRIPP	NC	10	6	5	21	16	336	
KL7GLL	*GENE	VA	2	0	0	2	2	4	
AG4QZ	*MO	NC	0	1	0	1	1	1	
K5NZ	*MIKE	TX	123	91	65	279	43	11997	SO1R
K5TR (WM5R)	KEN	TX	131	86	63	280	42	11760	
N5DO	*DAVE	TX	106	108	30	244	47	11468	
K5AM	MARK	NM	75	50	41	166	32	5312	
KC5R	**AL	LA	44	42	15	101	36	3636	
W5TM	*ED	OK	37	37	24	98	35	3430	
WQ5L	RAY	MS	57	0	0	57	27	1539	
KD5TMF	*COLIN	TX	40	0	0	40	19	760	
NI5F	*BILL	MS	35	0	0	35	15	525	
N6ZZ	*PHIL	NM	0	0	23	23	14	322	
K6LA	KEN	CA	135	112	65	312	49	15288	SCCC
N6MJ	*DAN	CA	185	100	0	285	52	14820	SCCC
W6EU	JIM	CA	134	107	68	309	45	13905	NCCC#1
AE6Y	ANDY	CA	132	84	60	276	45	12420	NCCC#1
W6YX (N6DE)	BILL	CA	136	107	50	293	41	12013	NCCC#1
K6XX	BOB	CA	134	95	53	282	42	11844	NCCC#1
KI7WX (at AI6V)	MARK	CA	130	97	38	265	44	11660	NCCC#1
NI6T	GARRY	CA	131	87	59	277	42	11634	NCCC#1
K6LRN	DICK	CA	96	84	53	233	43	10019	NCCC#1
W6TK	DICK	CA	95	101	50	246	39	9594	SCCC
WX5S (at N6RO)	MATT	CA	111	74	43	228	39	8892	NCCC#1
KU6J	ERIC	CA	83	96	40	219	34	7446	NCCC#1
N6ZFO	BILL	CA	96	75	30	201	35	7035	NCCC#2
K6EP	ERIC	CA	103	52	38	193	33	6369	NCCC#2
N9JIM	*JIM	CA	132	28	0	160	38	6080	NCCC#2
W6IXP	TOM	CA	78	69	53	200	30	6000	NCCC#1
N6NF	TOM	CA	91	45	39	175	34	5950	
AD6E	*AL	CA	96	74	0	170	33	5610	NCCC#2
K6EY	*BECKY	CA	80	61	16	157	34	5338	SCCC
K6III	TEX	CA	98	33	0	131	36	4716	NCCC#2
N6RT	*DOUG	CA	77	55	0	132	33	4356	SCCC
K6ENT	*KENT	CA	75	48	20	143	30	4290	NCCC#2
ND2T	*TOM	CA	59	54	29	142	26	3692	NCCC#2
AD6TF	JIM	CA	76	0	0	76	30	2280	NCCC#2
W1HDO	KEN	CA	39	34	0	73	28	2044	
K6UFO	*MORK	CA	51	16	0	67	21	1407	NCCC#2
K6OWL	*MARK	CA	34	36	0	70	18	1260	
KB6VME	*STEVE	CA	32	23	0	55	19	1045	
W7SW	*SCOTTY	CA	33	12	0	45	23	1035	
K6CSL	BERT	CA	22	23	1	46	17	782	
W6ZZZ	*MARK	CA	14	28	10	52	15	780	NCCC#2

Call	Name	QTH	20	40	80	QSO	Mlt	Score	Team
K6ZCL	*TED	CA	15	18	8	41	16	656	SCCC
WA7BNM	*BRUCE	CA	0	26	0	26	13	338	SCCC
W4EF	*MIKE	CA	0	0	16	16	5	80	
K6LL	DAVE	AZ	165	113	67	345	46	15870	SCCC
W7WA	DAN	WA	132	114	69	315	46	14490	SO1R
N7LOX	BRIAN	WA	114	97	48	259	44	11396	SO1R
W7WW	DAVE	AZ	125	77	20	222	47	10434	SCCC
N7GYD	MITCH	WA	97	108	51	256	40	10240	SO1R
KN5H	STEVE	AZ	106	78	59	243	41	9963	CADXA
K7RAT	BERT	OR	85	88	74	247	37	9139	
(N6TR)									
W7UQ	*JOE	ID	130	82	28	240	37	8880	
(KL9A)									
W7OM	ROD	WA	109	79	39	227	39	8853	SO1R
K7RI	**DAN	WA	115	69	19	203	42	8526	SO1R
(K7SS)									
K8IA	*BOB	AZ	86	94	52	232	35	8120	CADXA
W8AEF	PAUL	AZ	77	55	48	180	29	5220	CADXA
KI7Y	*JIM	OR	96	62	9	167	31	5177	
K7ZO	SCOTT	ID	78	33	33	144	34	4896	
N9ADG	*BRIAN	WA	59	39	7	105	24	2520	
W7GTO	*PAT	WA	46	31	5	82	19	1558	SO1R
KW8N	BOB	OH	119	115	81	315	45	14175	DLCT
K9TM	BOB	OH	90	101	81	272	44	11968	MRRC
ND8DX	ED	OH	75	87	64	226	39	8814	MRRC
K8CC	DAVE	MI	17	68	79	164	36	5904	MRRC
N8EA	*JOE	MI	51	59	46	156	34	5304	
K8MR	JIM	OH	45	31	48	124	37	4588	MRRC
K8KG	*KEVIN	MI	68	45	12	125	31	3875	
N8AA	*JOHN	OH	52	30	0	82	26	2132	
W8WTS	*JIM	OH	28	1	16	45	22	990	
KT8X	DENNIS	MI	25	21	0	46	18	828	
W8UE	*TED	MI	0	2	32	34	19	646	
K9PG	MARK	IL	117	154	86	357	51	18207	DLCT
(at WB9Z)									
W9RE	MARK	IN	121	116	90	327	45	14715	DLCT
WT9U	JIM	IN	94	89	88	271	46	12466	
K9ZO	MARK	IL	102	115	76	293	42	12306	DLCT
K9BGL	KARL	IL	89	106	76	271	42	11382	
KI9A	MARK	IL	59	101	80	240	38	9120	DLCT
KE9S	JEFF	WI	63	74	56	193	40	7720	SMC #1
WI9WI	JIM	WI	73	64	62	199	38	7562	
K9JS	*JOHN	IL	46	76	38	160	41	6560	
W9IU	DON	IN	51	81	32	164	39	6396	
WA9IRV	RON	WI	56	87	0	143	34	4862	SMC #1
AJ9C	*MARK	IN	0	68	58	126	35	4410	
N9RV	PAT	IN	0	29	83	112	35	3920	
AA9RT	*LOU	IL	36	45	27	108	34	3672	SMC #1
K9NW	COLUMBIA	IN	73	46	0	119	29	3451	DLCT
KC9UM	*GARY	IL	57	43	18	118	29	3422	SMC #1
KJ9C	MEL	IN	20	31	47	98	31	3038	
KG9N	CHUCK	IL	22	28	36	86	26	2236	
K9ZF	*DAN	IN	0	55	0	55	23	1265	
WB0O	BILL	ND	130	104	85	319	43	13717	DLCT
WD0T	TODD	SD	103	122	87	312	42	13104	DLCT
(at KD0S)									
K0UK	BILL	CO	115	91	69	275	43	11825	GMCC
K0OU	STEVE	MO	98	109	63	270	42	11340	DLCT
N0AT	RON	MN	96	95	72	263	41	10783	
KT0R	DAVE	MN	69	96	55	220	42	9240	
W0ETT	*KEN	CO	105	86	5	196	36	7056	GMCC
N4VI	*CHRIS	CO	79	25	30	134	31	4154	GMCC
AC0W	*BILL	MN	39	48	43	130	30	3900	
W8TM	*PAUL	NE	0	106	0	106	30	3180	
N0AC	*BILL	IA	17	19	0	36	17	612	
VE5SF	*SAM	VE5	91	89	9	189	34	6426	
VE4GV	*ROB	VE4	73	51	0	124	34	4216	
VY1JA	*JAY	VE8	46	16	0	62	17	1054	
VE4YU	*ED	VE4	0	38	0	38	20	760	
PY5EG	OMS	PY	94	38	6	138	39	5382	
YN1BB	*ROBERT	YN	12	0	0	12	8	96	

* indicates Low Power
** indicates QRP

Results, August 2002 North American QSO Party—SSB

Bruce Horn, WA7BNM
bhorn@hornucopia.com

Proving that he can win in both the winter and summer North American QSO Parties, N6MJ led all single-op contestants with 240,555 points. K4WX and N6NF rounded out the top three places by also recording more than 1000 QSOs each. K5WA and N6ED operating K6NA and K4AB took the next three places with only 2k points separating fourth through sixth places. K0UK took seventh, while frequent top-tenner, W5AO operated W5TM for eighth place. N0AV followed closely in ninth, while N4BP took tenth without making any QSOs on 160 or 80 meters.

The multi-two category was an all-Texas battle for the first three places. The W5NN crew took first, while W5KFT edged K5TR by less than 800 points for second. While the scores weren't close to the January results, this was one of the most hotly contested multi-two categories in NAQP history.

In the team competition, the Tennessee Contest Group #1 team, with two top-ten single ops, comfortably beat the Southern California Contest Club #1 team, which also had two top-ten single ops. The Northern California Contest Club #1 team squeaked into third place by less than 300 points. An examination of the team results shows that it is important for all registered team members to submit their logs. First and third place teams had all five team members contributing to the team score, while the second and fourth place teams only had four members each.

As a reminder that success in contests is not always measured by the total points scored, N1NJN reported that he was excited that one his three total QSOs during the contest was with a station in Idaho—the first station he had ever worked outside of the tri-state New York City area.

Single Op Top Ten Breakdowns

Call	*Score*	*QSOs*	*Mults*	*160*	*80*	*40*	*20*	*15*	*10*	*Team*
N6MJ (at W6KP)	240,555	1185	203	7/5	78/36	183/48	534/56	362/48	21/10	SCCC #1
K4WX	229,369	1057	217	50/20	187/44	300/51	277/48	219/41	24/13	TCG #1
N6NF	192,648	1047	184	12/6	67/27	305/52	236/47	424/50	3/2	
K5WA	175,536	828	212	37/16	55/26	226/47	312/55	142/46	56/22	
K6NA (N6ED)	173,922	861	202	28/13	102/40	158/44	284/53	280/47	9/5	SCCC #1
K4AB	173,524	923	188	21/15	105/36	359/49	330/49	98/30	10/9	SSSC #1
K0UK	170,667	903	189	22/12	124/39	132/42	494/51	120/41	11//4	GMCC: Horsethief Pass
W5TM (W5AO)	163,280	785	208	62/29	144/42	156/44	319/51	48/23	56/19	TCG #1
N0AV	162,384	816	199	81/32	125/37	252/48	284/51	68/27	6/4	SMC #1
N4BP	156,420	948	165	0/0	0/0	169/43	604/59	139/41	36/22	FCG #1

Multi-Two Breakdowns

Call	*Score*	*QSOs*	*Mults*	*160*	*80*	*40*	*20*	*15*	*10*
W5NN	363,771	1497	243	71/25	165/38	315/50	606/59	275/48	65/23
W5KFT	338,499	1393	243	47/21	108/37	326/53	494/59	347/50	71/23
K5TR	337,716	1431	236	37/18	124/37	210/46	683/60	305/50	72/25

Team Scores

1. TCG #1

K4WX	229,369
W5TM	163,280
NA1QP	114,224
NY4T	90,374
K4RO	52,800
Total	**650,047**

2. SCCC #1

N6MJ	240,555
K6NA	173,922
W6TK	108,914
K6AM	5,928
Total	**529,319**

3. NCCC Team #1

K5RC	134,435
K6IF	117,593
AE6Y	89,782
NT6K	55,428
K6LRN	15,343
Total	**412,581**

4. SSSC #1 (K4AB, W4ATL, AA4LR, K4CU) 412,290
5. SMC #1 (N0AV, K9NR, KX9DX, WA1UJU) 404,796
6. FCG Team #1 (N4BP, NF4A) 295,438
7. SSSC #2 (K7SV, KU8E, N4CW) 260,403
8. GMCC: Horsethief Pass (K0UK, WW1M, K0GAS, W0ETT/M, NZ4DX) 252,104
9. NCCC Team #2 (AD6TF, N6ZFO, K6RIM, K6ENT, N2ALE) 245,395
10. TCG #2 (NA4K, K4BEV, K9JLS, K4BP) 204,439

11. Minnesota Wireless (N0AT, KT0R) 195,822
12. SMC #5 (K9PW, KA0GGI, K0JPL, KM9M) 190,904
13. SMC #2 (W9IU, WA9IRV, W9RE, N9RV) 185,414
14. TDXS (K5XR, KG5U) 157,520
15. SCCC #2 (N6WIN, N6TW, N6ZZ, N6AA) 154,297
16. GMCC: Lizard Head Pass (AB0MV, KI0II, W0TM) 148,162
17. NCCC Team #3 (W6ISO, K6TA, ND2T, W6ZZZ, N6EM) 89,915
18. SMC Lafayette (N9KT, K9WX, N9LF, K9EFP) 88,856
19. Kentucky Contest Group (N4GN, W4DHE) 75,479
20. FCG Team #4 (K5KG, W4ZW, K4LOG) 68,588

21. SMC #4 (K9MI, N9MSG) 66,024
22. TCG #3 (KB4KA, WN4M, KE4KMG) 65,793
23. FCG Team #3 (WC4E, KB4N) 58,204
24. SMC #3 (K9IJ, W9GIG, N9GUN) 36,763
25. FCG Team #2 (W4SAA, NA4CW, N2NL) 35,128
26. SSSC #3 (W4NTI, WB4SQ, WB6BWZ) 34,400
27. MRRC #2 (K8MR, K8KHZ) 24,773
28. TCG #4 (AF4QB, N5NW, WA4JA, KE4OAR/0) 17,998
29. NWHCARES (N5LYG, VE3VIP/W5) 16,022
30. MRRC #1 (K5IID, KW8W, K9NW) 15,452

31. TCG #5 (W4BCG, W4TDB, N4JN, WB9BSH) 11,847

Single Operator Scores

Call	Score	QSOs	Mults	QTH	Team
NA1QP	114,224	649	176	CT	TCG #1
K1VUT	74,168	508	146	MA	
WA1UJU	53,560	412	130	WI	SMC #1
NY1S	26,520	255	104	ME	
KK1L	16,471	181	91	VT	
W0BR	12,474	154	81	CT	
K1YA	5,763	113	51	MA	
N1MD	2,925	75	39	CT	
K1JN	2,016	56	36	CT	
K1VU	2,006	59	34	MA	
W1VET	1,560	52	30	RI	
KD1EA	1,148	41	28	MA	
KB1GHC	810	45	18	MA	
KA1EZE	260	20	13	RI	
W1AW	192	24	8	CT	
(KE1L)					
W2PA	16,318	199	82	NY	
K2BF	9,610	155	62	NY	
N2KGO	988	38	26	NJ	
KC2HZW	320	20	16	NY	
N1NJN	9	3	3	NY	
AA3ZE	48,256	377	128	PA	
NA3V	13,246	179	74	PA	
KA3QOT	560	35	16	PA	
N4GG	378	21	18	MD	
AJ3M	135	15	9	DE	
K4WX	229,369	1057	217	TN	TCG #1
K4AB	173,524	923	188	AL	SSSC #1
N4BP	156,420	948	165	FL	FCG Team #1
NX9T	144,708	778	186	NC	
NF4A	139,018	781	178	FL	FCG Team #1
K7SV	137,238	771	178	VA	SSSC #2
W4NF	94,200	628	150	VA	
NY4T	90,374	619	146	TN	TCG #1
W4ATL	88,242	573	154	GA	SSSC #1
KU8E	82,915	515	161	GA	SSSC #2
NA4K	82,852	538	154	TN	TCG #2
AA4LR	77,154	501	154	GA	SSSC #1
K4CU	73,370	506	145	AL	SSSC #1
(KA9EKJ)					
N4GN	59,817	381	157	KY	Kentucky Contest Grp
K5KG	57,552	436	132	FL	FCG Team #4
K4BEV	55,857	433	129	TN	TCG #2
K4RO	52,800	400	132	TN	TCG #1
KB4KA	41,990	323	130	TN	TCG #3
WC4E	40,474	343	118	FL	FCG Team #3
N4CW	40,250	350	115	NC	SSSC #2
N4RZ	36,300	330	110	KY	
W4NTI	32,596	281	116	AL	SSSC #3
AB4GG	30,305	319	95	TN	
N4JED	26,500	265	100	VA	
K4BP	25,482	274	93	TN	TCG #2
K4TX	25,414	262	97	VA	
W4SAA	25,088	224	112	FL	FCG Team #2
WN4M	21,850	230	95	TN	TCG #3
KB4N	17,730	197	90	FL	FCG Team #3
W4DHE	15,662	191	82	KY	Kentucky Contest Grp
WD2E	13,804	203	68	TN	
AF4QB	12,212	172	71	TN	TCG #4
K4IQJ	11,850	158	75	AL	
W4ZW	7,540	130	58	FL	FCG Team #4
WB8LZR	7,296	114	64	NC	
NA4CW	7,080	118	60	FL	FCG Team #2
KV4CN	7,080	120	59	NC	
W4BCG	6,313	107	59	TN	TCG #5
N4EIL	6,032	104	58	GA	
KA1DWX	5,088	96	53	TN	
K4LOG	3,496	76	46	FL	FCG Team #4
W4TDB	3,256	74	44	TN	TCG #5
K4ALH	2,992	68	44	FL	
N2NL	2,960	74	40	FL	FCG Team #2
KT4Q	2,772	84	33	GA	
KG4OJT	2,475	75	33	VA	
KO4OL	2,176	68	32	KY	
KG4QQX	2,091	51	41	GA	
WA4JA	2,088	58	36	TN	TCG #4
KE4KMG	1 953	63	31	TN	TCG #3
N4JN	1,708	61	28	TN	TCG #5
WB4SQ	1,624	56	29	GA	SSSC #3
AG4IM	888	37	24	SC	
W4KAZ	702	39	18	NC	
WB9BSH	570	30	19	TN	TCG #5
WB6BWZ	180	15	12	GA	SSSC #3
KB2NSX	12	4	3	VA	
K5WA	175,536	828	212	TX	

Call	Score	QSOs	Mults	QTH	Team
W5TM	163,280	785	208	OK	TCG #1
(W5AO)					
W5WMU	147,857	743	199	LA	
K5XR	123,120	684	180	TX	TDXS
(W5ASP)					
N5DO	114,534	707	162	TX	
K1NT	96,446	581	166	TX	
N5YA	74,034	457	162	TX	
W5UE	71,896	473	152	MS	
KG5U	34,400	344	100	TX	TDXS
N5PJY	25,110	270	93	TX	
W5MK	24,582	241	102	AR	
K5RPD	19,740	210	94	AR	
N6ZZ	13,797	189	73	NM	SCCC #2
KA5BKG	13,468	182	74	TX	
KE5OG	12,408	188	66	TX	
N5LYG	8,946	142	63	TX	NWHCARES
WA5CHX	8,190	126	65	LA	
VE3VIP/W5	7,076	116	61	TX	NWHCARES
N5RG	6,664	119	56	TX	
KB5IXI	5,590	130	43	MS	
KD5PJB	5,151	101	51	TX	
K5ACO	4,896	102	48	AR	
WA0SXV	4,624	136	34	NM	
KD4RHO	420	35	12	TX	
N6MJ	240,555	1185	203	CA	SCCC #1
N6NF	192,648	1047	184	CA	
K6NA	173 922	861	202	CA	SCCC #1
(N6ED)					
K6IF	117,593	749	157	CA	NCCC Team #1
W6TK	108,914	767	142	CA	SCCC #1
AE6Y	89,782	583	154	CA	NCCC Team #1
N6WIN	89,280	620	144	CA	SCCC #2
AD6TF	82,950	553	150	CA	NCCC Team #2
N6ZFO	72,111	559	129	CA	NCCC Team #2
AA6PW	66,666	542	123	CA	
K6RIM	60,878	499	122	CA	NCCC Team #2
NT6K	55,428	447	124	CA	NCCC Team #1
N6TW	50,600	440	115	CA	SCCC #2
K6III	50,512	451	112	CA	
K6UFO	40,252	347	116	CA	
KA6MAL	34,444	316	109	CA	
W6ISO	33,180	316	105	CA	NCCC Team #3
K6TA	30,690	310	99	CA	NCCC Team #3
W6IXP	29,998	283	106	CA	
K6ENT	26,936	296	91	CA	NCCC Team #2
N6VH	17,370	193	90	CA	
K6LRN	15,343	229	67	CA	NCCC Team #1
ND2T	14,640	183	80	CA	NCCC Team #3
WA6PXU	11,388	156	73	CA	
NW6R	10,082	142	71	CA	
AC6YV	10,074	138	73	CA	
K6EP	8,576	134	64	CA	
W6FRH	8,184	124	66	CA	
W6ZZZ	6,264	116	54	CA	NCCC Team #3
K6AM	5,928	114	52	CA	SCCC #1
N6EM	5,141	97	53	CA	NCCC Team #3
KD6PQF	3,400	85	40	CA	
N2ALE	2,520	70	36	CA	NCCC Team #2
KK6F	2,112	64	33	CA	
W6RCL	1,734	51	34	CA	
N6AA	620	31	20	CA	SCCC #2
K6OWL	522	29	18	CA	
WA7BNM	448	28	16	CA	
KG6JOT	400	25	16	CA	
NC6P	299	23	13	CA	
K6LDX	180	15	12	CA	
KB6OJS	130	13	10	CA	
KH6B	9	3	3	KH6	
K7RI	150,705	985	153	WA	
(KD7SGR)					
K5RC	134,435	805	167	NV	NCCC Team #1
W7ZR	132,932	796	167	AZ	
N7GYD	62,700	660	95	WA	
WS7V	30,680	295	104	WA	
N7LOX	30,495	321	95	WA	
KI7Y	22,442	229	98	OR	
W0ETT/M	21,714	282	77	WY	GMCC: Horsethief Pass
AL1G	21,350	305	70	KL7	
K7WM	12,728	148	86	AZ	
NB7V	8,710	130	67	MT	
KN7O	4,250	85	50	AZ	
W6RLL	2,412	67	36	AZ	
K7ESU	2,400	75	32	UT	
K8IR	45,012	341	132	MI	

Call	Score	QSOs	Mults	QTH	Team
W8MJ	38,390	349	110	MI	
NU8Z	26,488	308	86	MI	
AK8B	19,669	221	89	OH	
K8MR	15,573	179	87	OH	MRRC #2
K5IID	14,800	200	74	WV	MRRC #1
N8EMS	13,475	175	77	WV	
K8UP	11,214	178	63	MI	
KC8LTL	10,432	163	64	MI	
W8WDX	9,702	154	63	MI	
K8KHZ	9,200	184	50	MI	MRRC #2
W8UE	8,777	131	67	MI	
K8CV	8,190	130	63	MI	
WR0N	4,002	87	46	WV	
N5NW	3,362	82	41	OH	TCG #4
KC8RDO	1,372	49	28	OH	
KW8W	640	32	20	OH	MRRC #1
K9NW	12	4	3	OH	MRRC #1
K9PW	126,914	713	178	IL	SMC #5
K9ZO	106,914	618	173	IL	
KE9S	101,569	601	169	WI	
K9NR	97,686	603	162	IL	SMC #1
KX9DX	91,166	577	158	IL	SMC #1
W9IU	85,910	605	142	IN	SMC #2
K9MI	60,024	488	123	IN	SMC #4
WA9IRV	52,668	418	126	WI	SMC #2
N9KT	47,766	419	114	IN	SMC Lafayette
K9JLS	40,248	344	117	IL	TCG #2
K9IJ	29,040	264	110	IL	SMC #3
K9WX	28,000	280	100	IN	SMC Lafayette
W9RE	26,676	247	108	IN	SMC #2
N9NE	24,960	260	96	WI	
N9RV	20,160	252	80	IN	SMC #2
NN9K	13,724	188	73	IL	
N9LF	10,675	175	61	IN	SMC Lafayette
W9FGH	10,560	160	66	IL	
W9GIG	7,128	108	66	IL	SMC #3
N9NT	7,040	128	55	IL	
N9MSG	6,000	125	48	IL	SMC #4
K9EFP	2,415	69	35	IN	SMC Lafayette
K9UQN	2,387	77	31	IL	
KM9M	800	40	20	IL	SMC #5
N9GUN	595	35	17	IL	SMC #3
N9KO/P	400	25	16	WI	
W9DLS	119	17	7	IL	
K0UK	170,667	903	189	CO	GMCC: Horsethief Pass
N0AV	162,384	816	199	IA	SMC #1
AB0MV	115,962	753	154	CO	GMCC: Lizard Head Pass
N0AT	107,500	625	172	MN	Minnesota Wireless
KT0R	88,322	559	158	MN	Minnesota Wireless
K1XT	64,735	535	121	MO	
K7RE	57,845	503	115	SD	
KA0GGI	44,958	381	118	MO	SMC #5
KF0U	37,278	327	114	CO	
KC0CZI	30,987	313	99	MO	
N0YYO	29,052	269	108	KS	
WW1M	22,540	245	92	CO	GMCC: Horsethief Pass
K0GAS	21,902	233	94	CO	GMCC: Horsethief Pass
K0JPL	18,232	212	86	MO	SMC #5
KI0II	16,800	210	80	CO	GMCC: Lizard Head Pass

Call	Score	QSOs	Mults	QTH	Team
W0TM	15,400	200	77	KS	GMCC: Lizard Head Pass
NZ4DX	15,281	259	59	CO	GMCC: Horsethief Pass
N0WY	13,875	185	75	NE	
K4IU	5,656	101	56	MN	
N0UX	4,455	99	45	CO	
W0IE	1,035	45	23	KS	
KE4OAR/0	336	21	16	MN	TCG #4
WV0H	64	8	8	CO	
VE3BUC	48,471	453	107	ON	
VE7FO	41,580	385	108	BC	
VE3KP	27,170	247	110	ON	
VE5SF	26,100	290	90	SK	
VE2AWR	25,542	258	99	PQ	
VE3DZ	21,384	243	88	ON	
VE3EBN	14,118	181	78	ON	
VA3XRZ	13,124	193	68	ON	
VE7NI	12,225	163	75	BC	
VA3NU	9,856	154	64	ON	
VE4YU	7,504	112	67	MB	
VE3YQY	6,156	114	54	ON	
VE2QY	1,782	54	33	PQ	
VY1MB	1,242	46	27	YT	
VA3HUN	476	34	14	ON	
CQ0BWW (CT1BWW)	18,585	295	63	CT	
SP6IEQ	49	7	7	SP	
PT2ND	42	7	6	PY	

Multi-Two Scores

Call	Score	QSOs	Mults	QTH
W5NN	363,771	1497	243	TX
(W5PR, N5RP, N5XJ, NX5M, UA0OFF, K5NZ)				
W5KFT	338,499	1393	243	TX
(K5PI, N6DE, KT5I, WW5X)				
K5TR	337,716	1431	236	TX
(WM5R, KK5MI, K5TR)				
K9SD	241,570	1190	203	IL
(K9SD, WB0DRH, KI9A)				
K5NA	240,055	1171	205	TX
(K5NA, K5DU, KI5DR, KD5SQF, KE5RS)				
W5SB	203,300	1070	190	TX
(KC5NSW, KD5NDZ, KD5TMF, KN5Z, KK5LD, NA5F, W5ADF, KE4NT, W5SB)				
AE9B	153,916	956	161	MO
(AE9B+)				
K4NO	98,049	609	161	AL
(K4NO+)				
W0UY	32,568	354	92	KS
(WT9U, W0UY)				
K0HM	23,763	267	89	CO
(AE0Q, KC0KLP, K0HM)				
AG1C	15,770	190	83	MA
(AG1C, K1RDD)				
W3GV	11,147	157	71	PA
(KB3A, KB3B, K3LD, KE3XR)				
FP/K9WM	5,720	130	44	FP
(KB9LIE, K9OT)				
K9USA	3,948	94	42	IL
(KA6A, KC9AZZ, W9FWS, KC9BAC, KB9VSI, KC9BAA, KC9BAD, KA9NNH)				
KD7OPX	160	16	10	WA
(N0AX, W7TRH, W7PDZ, KG7ZZZ, KD7FWQ)				

Check Logs: K6DGW, KB4ET, M0SDX, VY1JA

February 2003 CW Sprint Results

Boring Amateur Radio Club
15125 SE Bartell Rd
Boring, OR 97009
k7rat@kkn.net

The 1952 Olympics were held in the same city as the WRTC-2002 event—Helsinki. The Duke of Edinburgh arranged his schedule so he could be there for what was sure to be a historic moment—the running of the 1500-meter race (the metric mile). One of his countrymen was the favorite for that race and he wanted to be there to see the Union Jack raised. However, it was not to be. The English runner was jostled during the race and never got into contention. He finished fourth, a major disappointment. Three years later, this runner would retire from the sport and never run again in competition. He would go on to finish his degree at Oxford and live a long life. His name? Roger Bannister.

After this setback, John Landy (not to be confused with John Laney, K4BAI), became the favorite to run the world's first four-minute mile. He had a number of runs that came close, but could never get below 4:01:30. Every time he ran in competition, everyone wondered if this would be the time he put everything together and went below 4 minutes. It was an exciting time in the sport.

On the morning of May 6, 1954, Roger Bannister wasn't sure this was going to be a good day. There was a bad crosswind, 15 MPH, with 25 MPH gusts and he figured nothing special would happen that day. It was the annual race where the Athletic Association competed against the university at Oxford. He had a casual lunch with friends. However, he knew he had to show up since everyone was expecting him.

Shortly before the race, the wind seemed to calm down some. It was a good sign. His two friends, Chris Chataway and Chris Brasher, were there. They had been training with him throughout the winter and were integral pieces of the puzzle. Brasher took the lead for the first half of the race, and then Chataway set the pace for the 3rd and 4th laps. With about 300 meters left, Roger kicked it into high gear and pulled away. He nearly collapsed at the finish line and a hush fell over the stadium. Had he done it? Had he run the first 4-minute mile?

The judges huddled and confirmed that the three times taken agreed and then the PA announcer only had to utter the single word "three" for pandemonium to break out.

Roger Bannister had earned himself a place in history. John Landy would quickly run a faster mile, and by 1957, a number of runners had eclipsed the mark. But Roger was the first.

Fast forward to the 52nd running of the *NCJ* CW Sprint, and another historic run occurred. Ending years of speculation as to if it was even possible, Bill Fisher, W4AN, became the first person to finish with 400 or more QSOs in the CW Sprint. He also claimed his fourth sprint victory, his second in succession and set a new score record.

Bill started out the contest on fire, with a first hour of 122 QSOs, the most QSOs ever seen in a CW Sprint for one hour. His final score also set a new record, beating out the N5TJ score from February 2000. Now that the mental barrier of 400 QSOs has been broken, who will be the next one to use page 9?

QRP Top Ten

If you think "nobody ever heard me" and you have not operated QRP in this contest, then you should try it sometime. Six brave souls jumped into battle this

Guest Operator List

K7RI (K7SS at K7RI)
K9SD (KA0GGI)
KL7WV (W3YQ)
N2RM (N2NC)
N4AO (WC4E)
N6MJ (N6MJ at W6KP)
NT5TU (UA0OFF)
W4CAT (W4PA)
W5KFT (K5PI)
W6EEN (N6RT)
W6JPL (W4EF)
W6YL (W6CT)
W7TTT (K5RC)
W7UQ (KL9A)
W8KW (W8UE)
WO4G (K9VV)
WR3O (K4RO)
WW4R (K4WX)
XF1K (N6VR)
ZF1DZ (VE3DZ)

The March to 400 QSOs Record Holders Over the Years

N6BT–231–September 1977
K3UA–285–July 1978
N6BT–286–September 1978
N2NT–304–February 1979
N2NT–327–September 1979
N2NT–330–February 1981
K5ZD–331–September 1981
K5ZD–345–February 1982
K5ZD–350–September 1982
N5TJ–358–February 1991
N5TJ–375–February 1992
N5TJ–381–February 2000
N6TR–393–February 2001
N6TR–396–February 2002
W4AN–402–February 2003

Top 10 Golden Logs

W6EEN	378
N6AN	334
N8EA	331
NA0N	253
K4MX	208
VE3IAY	168
K9TM	149
K8JM	125
VE3SMA	101
K4BAI	90

Top 10 Band Changes

K4AAA	213
W4CAT	164
N2IC	150
N9RV	147
AG9A	142
N2NT	126
K9PG	112
K5GN	111
K3WW	110
W6EEN	108

Top 10 Scores

Call sign	*Score Changes*	*Band Lost*	*QSOs*	*00Z*	*01Z*	*02Z*	*03Z*
K4AAA	21306	213	6	122	99	86	97
N6TR	20436	106	1	111	101	93	88
W6EEN	20412	108	0	107	96	82	93
N2IC	20228	150	2	108	92	86	103
K5ZD	19710	38	2	94	97	88	86
N2NL	19635	97	6	101	85	89	83
N5RZ	19451	96	9	107	90	82	89
N2NT	19380	126	2	119	89	84	89
K5GN	19084	111	2	98	93	80	97
W4CAT	19000	164	4	107	100	80	94

Top 10 QSOs

K4AAA	402
N6TR	393
N2IC	389
W4CAT	380
N2NT	380
W6EEN	378
N5RZ	367
K5GN	367
N9RV	366
K5ZD	365

Top 10 Multipliers

N2NL	55
W6EEN	54
K5ZD	54
N6RO	54
K9ZO	54
K4AAA	53
N5RZ	53
K6LA	53
N6AN	53
N2RM	53
K7RI	53
NT1N	53

Top 10 Low Power

K7RI	15741
K7SV	15600
W4OC	14750
K1HT	14600
N0AX	14500
W6OAT	14455
K4XU	13019
W7UQ	13018
N8AA	12985
KJ9C	12576

Top 10 QRP

NC7J	10575
KG5U	7480
W8TM	4756
KC5R	3850
WC7S	990
AB1AV	4

time, armed with less than 5 W of RF energy. Dave Fischer, W7FG, piloted NC7J to victory with an awesome 235 QSOs in the log, just missing the QRP record by small margin. One wonders if being in Utah helps us pull him out of the noise. Sprint QRP veteran Dale Martin, KG5U, came in second with 187 QSOs.

Low Power Top Ten

There was a close race for the top low power score between two people who automatically start spelling their last names when asked for them. Danny Eskenazi, K7SS, piloted K7RI to a first place showing and a new low power record. He erased the previous record of 15,272 points set by N5TJ back in September 1998 and now holds both the QRP and low power score records. Close on Danny's heels was Larry Schimelpfenig, K7SV, who did finish with 300 QSOs (3 more than Danny), but was one multiplier down. Your South Carolina multiplier, W4OC, came in fourth, edging out strong efforts from K1HT, N0AX and W6OAT. K4XU and KL9A had nearly the same scores for 7th and 8th place. N8AA and KJ9C rounded out the top ten–with very impressive scores over 12,500 points.

High Power Top Ten

Bill Fisher, W4AN, piloted the K4AAA station to his second consecutive victory, and 4th overall. Coming in second was Tree, N6TR with 395 QSOs. Bill was ahead of Tree by 11 QSOs after the first hour, but Tree caught up with 50 minutes to go before Bill sprinted to the finish. Less than a QSO behind Tree, Doug Brandon, N6RT, operating at W6EEN finished with "only" 378 QSOs, but 54 multipliers. Operating his last CW Sprint from Colorado, Steve London, N2IC, had 389 QSOs. All four of these scores beat the previous record score.

Randy, K5ZD, once again demonstrated that it is possible to make the top ten from the Northeast and came in fifth, followed by Dave, N2NL, who has now made three consecutive top ten showings, improving his position each time. Sprint veterans N5RZ, N2NT, K5GN and W4PA operating as W4CAT round out the top ten.

All of the stations in the top ten appeared to be using two radios, although K5ZD only had 38 band changes.

Team Competition

Twenty-one teams were registered this time around. A team is any group of up to ten stations that compete with other teams. Think of them as one time virtual clubs. Sprint teams are registered before the contest on the *NCJ* Web page (**www.ncjweb.com**). The Southern California Contest Club recovered from their 3rd place showing in September to take first place with an impressive score of 163,373 points and new team score record.

Team Scores

SCCC #1		SMC-Cat #1		SSB #1		NCCC #1	
W6EEN	20412	AG9A	18304	K4AAA	21306	N6TV	18258
K6LA	18338	N9RV	17934	N2NL	19635	N6RO	17388
N6MJ	17850	K9PG	17732	W4CAT	19000	AE6Y	14739
N6AN	17702	K9NW	17628	K1TO	16692	K6XX	14448
K6LL	16032	WD0T	16309	WR3O	14798	NI6T	13566
K6NA	15963	NT1N	16165	KT3Y	14790	K7NV	13377
N6AA	15827	W9RE	15400	N4AO	13872	W6RGG	12852
AC6T	15300	N9CK	14112	K3MM	13662	N6PN	10622
W6JPL	14357	KA9FOX	13780	W9WI	9744	N6ZFO	10125
W6TK	11592	WB0O	13500		**143499**	KU6J	8358
	163373		**160864**				**133733**

5. CPC (N6TR, K7RI, K5NZ, W7WA, N0AX, W7UQ, N7LOX, KL2A, N7WA) 123969
6. FRC Domestic (N2NT, N2RM, AA3B, K3WW, N3RD, K3MD, N8NA) 103772
7. SSC #2 (K7SV, W4OC, K4NO, N4OGW, K4FXN, KU8E, W4AU, K4MA) 101027
8. NCCC #2 (N6XI, W6OAT, AD6E, K2KW, K6CTA, K6LRN, W0YK, W6EU, W6IXP, K6DGW) 92746
9. Austin Powers (N5RZ, N3BB, W5KFT, K5WA, N5DO, KG5U, NT5TU) 85629
10. Azenmokers (N6ZZ, N5OT, K5KA, KY7M, K5YAA, WD7Z) 85082
11. YCCC #1 (K5ZD, K1KI, K1DG, K1HT, KT1V, N1XS, N2MG) 82905
12. SMC-Cat #2 (K9ZO, WT9U, K9MMS, KG9X, WI9WI, WA9IRV, WX9U) 80718
13. SSB #3 (WO4G, W4NZ, AA4GA, W4AA, ND4AA, N4ZR, K4LW) 54308
14. SMC-Cat #3 (K9BGL, KJ9C, N9JF, W0UY, N0AV) 45758
15. YCCC #2 (KM3T, K2KQ, K1PQS, NY1S, K1EBY, K1GU) 44626
16. MRRC (N8EA, K8MR, K9TM, K8JM) 43567
17. GMCC (N2IC, W0ETT, K0BJ) 37189
18. SCCC #2 (W6MVW, XF1K, NE6I, K6EY) 24564
19. YCCC #3 (N2GC, K1EA, K1AR, KA1EZE) 21148
20. NCCC #3 (AD6TF, ND2T, W6YL) 11988
21. SSC #4 (N4GI,K4BAI) 6642

Records

With increased activity, more multipliers and good conditions, many new records were established. In the "improved their own record from before" category, we have K5ZD (MA), K1KI (CT), K1DG (NH), N2NT (NJ), K4AAA/W4AN (GA), N6ZZ (NM), W6EEN/N6RT (CA), N6TR (OR), K7RI/K7SS (WA), W7UQ/KL9A (ID), N8EA (MI), K8MR (OH), N2IC (CO) and WD0T (SD). It is interesting to note that the Washington record set by K7RI (K7SS) was with low power, eclipsing his previous state record set with high power. AA3B beat out K3WW's three-year-old record in Pennsylvania. The new kid N2NL beat out Contest Hall of Famer K1TO's Florida mark from September 1999. Larry, K7SV, beat a 14-year-old record from KT3Y in Virginia. The new noise from Oklahoma, Mark, N5OT, made his first 300 QSO showing to erase K3LR's record from just last September. Larry, K0SR, beat last year's Minnesota record from N0AT. VE5SF took VE5MX's four-year-old record away from him and LU1FAM set a new record in Argentina, previously held by LW9EUJ from September 2000.

The Southern California Contest Club set a new team record, beating out the February 2002 record from the Southern Sprint Coalition. K4AAA (W4AN) set a new score record, previous set by N5TJ three years ago. He also established a new QSO record, beating out N6TR's record from last year. The total of logs received was 202—a new record and we had 52 logs with 300 or more QSOs in them this time. The previous record was 38 from three years ago.

Another interesting record was set. The scores from this contest were published on the *NCJ* Web page the same week as the log submission deadline. This was made possible by the high percentage of logs that were submitted electronically. Another first is the Web entry log form that can be used if you kept a paper log. This form can found on the Web page and will format your log into Cabrillo and submit it. Many thanks go to Bruce, WA7BNM, for his software work and another example of how the Sprint is helping lead the way towards improved contest reporting (improved in both timeliness and accuracy–*Ed*).

In order to decrease the time between the contest and the scores being published, we have decided to reduce the log submission time for the sprints. Starting in September, the deadline will be seven days after the contest. Our goal will be to have the results up on the Web page within a couple of days after the deadline.

The updated records listing can be found elsewhere in this write-up, or on the Sprint Web page at **www.ncjweb.com**. Remember to check out the helpful Sprint Web pages at **n6tr.jzap.com/Sprint.html** and **www.contesting.com/articles/198**. Both of these Web pages have great information for both newcomers and Sprint veterans.

Friends and Loved Ones Remembered

One of the traditions of the CW Sprint is to remember those who have recently departed. Cat was the nickname for Cathy Obermann (the wife of Mark, AG9A) who passed away at a young age. Many of you who were at WRTC-2002 probably met Cathy. Shortly after that trip, she started down a terrible and short road. As you can see from all of the Cats in the scores listing, she touched many of us. Also remembered was Jim Maxwell, W6CF, who had operated a number of Sprints in the earlier years. As you probably know, Jim was a director for the ARRL and a reflector of many limericks. Finally, Sandy Lynch, W7BX, passed away very suddenly just before the Sprint. Many of you worked Sandy in the January NAQP CW contest. Hopefully, we can go another few years before having to remember anyone else.

Wrap Up

Once again, all logs were fully checked for accuracy. A report on how your log was scored can be received via return e-mail to **tree@kkn.net**. Congratulations to 14 of you who produced a golden log with no errors.

Mark you calendars now for the next CW Sprint on September 7 UTC from 0000:00.00Z to 0400:00.00Z. Remember the new log deadline—7 days.

Soapbox

Hoped to start my first Sprint slowly on 80 meters, but found almost nobody until the floodgates opened around 0230Z—then (to mix metaphors) I felt like I was out on the freeway on a tricycle. Only two contacts, but good experience!—Bill, AB1AV

First attempt at SO2R in the Sprint. Unfortunately, the second radio died about 1 hour into the contest. It slowed me down on 20m at first, but I think the benefits might have outweighed the distraction by the end of the contest had it continued to work.-AC6T

Thank you for the remarkable tribute paid to my wife Cathy who passed away at much too young an age. I love you CAT!—AG9A

My second Sprint. Operated an ICOM 706 on a G5RV from home at 100 watts. Added about 20 Qs to the last Sprint. I had a ball, am forever hooked—AK5E

My first CW Sprint. Had to do two major log program mods during the test due to inattention.—K0BJ

The start on 20 is always fun with my tiny signal. Also, takes me a bit to figure out which keys to push. Switching from the WPX RTTY contest got me all confused. Now back to RTTY—anything to avoid phone.—K1GU

A new personal best, thanks to my best multiplier total and to good conditions on 80.—K1HT

Very touching tributes by all those using CAT, JIM and SANDY. Oddly, I never heard a single NA DX station, despite activity from XE, ZF, XF, HI3, CO and HR. SO1R here. Note to self: check software *ahead* of contest next time. Oh, and congrats to Fisher for breaking the 4-minute mile-or something like that—K1TO

Turned on the radios to listen to 40 CW about 0315Z Saturday night. Hmm…what's all the activity? Oh! It's the Sprint! Haven't been in one in 20 years. Definitely not the contest for paper logs, nonmemory keyer and no transceive. Hey, what the heck. I still know the code, and Sprint used to be fun. Let's see...here's a blank SS Log page; that'll do. Tune up. Find a CQer. Zero beat him—fast, now! He won't wait. Dump in my call. Yes! Copy. Send...uh, what do they say on the reflector? Oh, yeah…send my call last if I own the frequency now. K5GN NR 1 ART MD K3KU. DIT. NA K3KU. Whee! Off we go. Eight QSOs in about 15 minutes; lousy luck with CQs. What happened to being fresh meat? Hey, all I'm hearing are West Coast stations. Where did everybody go? Oh, they went to 80. I'm really weak there. Gotta try. Switch the receiver band switch, transmatch bandswitch, and transmitter band switch. Ah, the efficiency of having only one antenna. Set transmatch knobs to numbers on chart. Peak receiver preselector. Hit spotting footswitch. Peak transmitter driver tuning for loudest sig. Let up on footswitch; flip transmitter to **TUNE**. Bring up the drive a little. Adjust plate tuning and loading. Run up the drive. Check reflected power on transmatch to make sure the settings are right. All set! Man, this 30-year-old gear is great. I'll bet that took less than two minutes. Let's go! Find a CQer. Zero beat him—fast, now! He won't wait. Dump in my call. Arrgh! Didn't get him. I am *really* weak on 80. CQs are fruitless. Five QSOs in about 12 minutes. That's all. Brief, but fun. Definitely not the contest for paper logs, non-memory keyer, and no transceive. When I worked Tree (aka Cat), I wrote his call as N7TR, and sat there staring at it, knowing that it was wrong, but unable to make my brain figure out what I had done until I tried to dupe him a few minutes later. And why did I write above "about 15 minutes," instead of being exact? Because I forgot to log the times! Definitely not the contest for stumbling into after a 20-year absence. Thanks to all of you for the QSOs.—K3KU

Personal best score! Excellent CW operators in this contest!—K3MD

Team: Southern Sprint Coalition #4—K4BAI

Twenty was tough from here on the grayline. My personal best! Missed Kentucky as usual!—K4FXN

Wow, wow and more wow. Personal record, but may not make the Top Ten. This contest really tests the station and the op.—K5GN

Personal best score. Great activity and multipliers.—K5ZD

Very difficult this year. A recurring local noise that sounds on the radio like an arc welder returned Friday night. It peaks around 40, but pretty much destroys 80 and 20. Played havoc with the WPX RTTY contest too. However, the sprint format makes it nearly impossible to recover info through it. Hope my error Rate isn't too high! Maybe better this summer, since the noise had disappeared for nearly a year.—K6DGW

Thank you for patience and repeats—K6EY

This humble score dedicated to the memory of my friends, W6CF and W7BX.—K6XX

Cat!—K9PG

Awful lot of CATs around, eh?—KC5R

This one was for Cathy (AG9A's wife). Sure were a lot of "Cats". Great!—KJ9C

Low power with hobo antennas is painful. Don't try this at home, kids. But, still lots of fun!—KM3T

Had fun for a couple hours. Some great operators out there!—KT0R

My goal was to make 20 QSOs per band. Mission accomplished.—N0AC

Someday I will get this down. Great contest and thanks for the QSOs. Thanks to Dick for the use of the station.—N1XS

This was my very first Sprint. Not knowing the contest, I set a goal of 200 Qs. I was surprised when I exceeded 300! I had a lot of fun, and will be back again.—N3RD

Wow, two VE5s and VE4s. Usual lack of VE1. Tried some SO2R, but found it tough to do. Worked two KLs in a row—both WA!—N4AF

First time ever over 300 QSOs—N5OT

The CW Sprint rules! Great to hear ever-increasing activity for a supposedly dying mode. Thanks to all for the QSOs and mults contributing to my personal best score.—N5RZ

My first time over 300 Qs in any sprint. My first time over 15k—*ever!* What a thrill to be part of a record setting team, SCCC #1. The Caltech station, W6UE, played well. I kept things simple; one radio, one amp, 4 antennas. Too bad 80 meters wasn't very good. My condolences to the families and friends of CAT, JIM and SANDY. The Sprint tribute to them was a wonderful gesture.—N6AN

Personal best score. Great to see the gang honoring Cat and Jim.—N6RO

Heard two mults that got away. Eighty meters was not good this time. Congrats to W4AN for breaking the sound barrier!—N6TR

I started on 40 meters, but my log started on 20 meters. Oops! SO2R has its disadvantages.—N6TV

Operated SO1R from old station in the Valley with lousy 80-meter dipole, K2/100 and ACOM 1000. Finally broke 300 Qs and probably made a personal best score despite missing three mults that I heard out of phase and couldn't snare. It was good to hear some Sprint newcomers. The next crop has been planted!—N6XI

Had a problem with the offset and slope on radio 2; abandoned SO2R. Ended up with about 6 band changes as opposed to 108 in the September Sprint!—N6ZZ

Great conditions, a big crowd and lots of fun—N8NA

Working VY1JA at the end pushed my multiplier to being simply awful, as opposed to being a total disaster. This contest remains a work in progress.—N9RV

Why BOB? Because it is the best CW name I know. Antennas included a Force 12 C3D at 70 feet and a 160-meter flat loop at 60 feet—NC7J

Great to work many JIMs and CATs.—ND2T

My best score and most multipliers to date.—NI6T

Another great time in the fastest four hours in radio and a new personal best for me, but shy of my goal of breaking 200 Qs. Saturday morning I got everything set up with the stealth 40 dipole at 25 feet in the yard to supplement the attack 20 meter dipole in the attic. Took my girlfriend out to an early matinee and dinner and was home with 50 minutes remaining before the start. Looking at the 80-meter dipole still in storage I knew I needed that one too and it was growing dark so I could get it into the yard also although its a bit of a challenge on my small lot in a highly restricted area. After dropping a few screws in the grass while attaching the 80-meter dipole, I got it up with about 20 minutes remaining. I'm glad I did because after making a good start on 20, I moved to 40 and promptly began to get beat up by terrible QRM/QRN. Being able to find a few Qs on 80 helped out and took me to a new personal best. Thanks to all the great ops who were able to copy my anemic signals with very few repeats. I'll be back in September to mount another try at 200 Qs.—NO5W

My first NA Sprint. Lots of fun but clearly I'm on the steep part of the learning curve!—VE3SMA

A hard enough contest with one radio, never mind when you're trying to cope with two for the first time.—VE4XT

I beat my previous QSO record (313) this time with 327. The mult gods, however, hooked up, but never made a QSO on it.—W5KFT

First full-time sprint in many moons. I'm starting to like them.—W5XX

Tough week for contesters. In memory of Jim Maxwell—W6IXP

Some many mults, so little time!—W6JPL

This was a lot of fun. The darn grey hair is making it.—W6MVW

In memory of W6CF—W7TTT

CW Sprint rules.—W7UQ

Rig is an Elecraft K1 running 4 Ws and a 40-meter dipole.—W8TM

Wow—what activity and operators! Keep it up! Best skill contest going.—W9RE

Whew!—WA3SES

New RFI problems forced me to run about 50 Ws on 80 and 20. My apologies to those trying to work me when my keying line locked up.— WI9WI

The CATs were out on the prowl! Our payers & blessings to Mark, AG9A. Many thanks to K0YW for use of KB station!!—WO4G

I should have prepared better for this one. Still the most intense four hours in radio. Congrats to W4AN for breaking the 400-QSO barrier. The tributes were touching. What a fine group of ops.—WR3O

Scores

* = low power
** = QRP

Call sign	Name	QTH	20	40	80	QSO	Mult	Score	Team
K5ZD	RANDY	MA	136	144	85	365	54	19710	YCCC #1
K1KI	TOM	CT	151	116	89	356	50	17800	YCCC #1
K1DG	CAT	NH	129	119	83	331	50	16550	YCCC #1
NT1N	CAT	CT	134	102	69	305	53	16165	SMC-Cat #1
K1HT	*CAT	MA	114	106	72	292	50	14600	YCCC #1
K3NA	ERIC	MA	74	76	76	226	44	9944	
KM3T	*CAT	MA	83	67	49	199	47	9353	YCCC #2
K1EA	KEN	NH	47	88	71	206	40	8240	YCCC #3
KT1V	TED	NH	81	43	46	170	42	7140	YCCC #1
K1PQS	GEO	ME	66	65	51	182	39	7098	YCCC #2
NY1S	*JOE	ME	81	42	37	160	43	6880	YCCC #2
K1EBY	*FRANK	CT	70	46	51	167	39	6513	YCCC #2
K1GU	NED	MA	74	48	25	147	38	5586	YCCC #2
N1XS	CHRIS	CT	36	45	25	106	35	3710	YCCC #1
K1AR	CAT	NH	0	8	38	46	26	1196	YCCC #3
KA1EZE	*RICK	RI	3	1	0	4	3	12	YCCC #3
AB1AV	**BILL	NH	0	0	2	2	2	4	
N2NT	CAT	NJ	134	158	88	380	51	19380	FRC Domestic
N2RM	CAT	NJ	139	94	90	323	53	17119	FRC Domestic
N2GC	MIKE	NY	86	108	66	260	45	11700	YCCC #3
K2PS	*PETE	NJ	92	70	63	225	50	11250	
K2KQ	*DON	NY	91	86	32	209	44	9196	YCCC #2
N2MG	MIKE	NY	17	26	54	97	35	3395	YCCC #1
AA3B	BUD	PA	103	134	83	320	50	16000	FRC Domestic
K3WW	CHAS	PA	106	115	81	302	50	15100	FRC Domestic
N3RD	DAVE	PA	105	106	91	302	49	14798	FRC Domestic
K3MM	TY	MD	114	88	95	297	46	13662	SSB #1
K3MD	JOHN	PA	98	78	64	240	45	10800	FRC Domestic
N8NA	*KARL	DE	98	83	44	225	47	10575	FRC Domestic
WA3SES	*ED	PA	15	14	2	31	21	651	
K3KU	*ART	MD	0	8	5	13	11	143	
K4AAA	CAT	GA	142	171	89	402	53	21306	SSB #1
N2NL	CAT	FL	151	139	67	357	55	19635	SSB #1
W4CAT	CAT	TN	127	164	89	380	50	19000	SSB #1
K1TO	CAT	FL	109	128	84	321	52	16692	SSB #1
N4AF	CAT	NC	127	113	85	325	49	15925	
K7SV	*CAT	VA	115	101	84	300	52	15600	SSC #2
WW4R	CAT	TN	93	118	83	294	51	14994	
WR3O	CAT	TN	88	112	102	302	49	14798	SSB #1
KT3Y	PHIL	VA	110	99	81	290	51	14790	SSB #1
W4OC	*DON	SC	116	92	87	295	50	14750	SSC #2
N4AO	CAT	FL	126	107	56	289	48	13872	SSB #1
K4NO	CAT	AL	119	117	64	300	46	13800	SSC #2
NA4K	STEVE	TN	107	104	70	281	49	13769	
W4NZ	CAT	TN	81	108	70	259	48	12432	SSB #3
K4FXN	DAN	KY	81	111	70	262	46	12052	SSC #2
K4AMC	JIM	TN	89	97	75	261	46	12006	
KU8E	*CAT	GA	81	124	42	247	48	11856	SSC #2
W4AU	CAT	VA	83	98	70	251	44	11044	SSC #2
AA4GA	*CAT	GA	81	84	54	219	47	10293	SSB #3
W9WI	*CAT	TN	67	94	71	232	42	9744	SSB #1
K4MX	*JERI	VA	32	93	83	208	46	9568	
K4MA	CAT	NC	65	70	50	185	47	8695	SSC #2
W4AA	*ART	FL	80	89	25	194	44	8536	SSB #3
ND4AA	*NORM	FL	42	47	44	133	40	5320	SSB #3
N4GI	COL	FL	10	64	38	112	36	4032	SSC #4
AK5E	*VAN	GA	41	63	1	105	31	3255	
K4BAI	CAT	GA	25	22	43	90	29	2610	SSC #4
K0EJ	*MARK	TN	0	34	0	34	20	680	

Call sign	Name	QTH	20	40	80	QSO	Mult	Score	Team
K4LW	*BOB	FL	6	14	0	20	18	360	SSB #3
N4DW	*DAVE	TN	8	0	0	8	6	48	
N5RZ	CAT	TX	163	126	78	367	53	19451	Austin Powers
K5GN	CAT	TX	169	125	73	367	52	19084	
N6ZZ	CAT	NM	133	153	65	351	52	18252	Azenmokers
N5OT	CAT	OK	112	133	93	338	49	16562	Azenmokers
K5GA	BILL	TX	138	124	74	336	49	16464	
K5NZ	CAT	TX	117	119	77	313	49	15337	CPC
N3BB	JIM	TX	134	102	76	312	49	15288	Austin Powers
K5KA	CAT	OK	121	114	88	323	47	15181	Azenmokers
W5KFT	ROB	TX	133	116	77	326	46	14996	Austin Powers
K5YAA	JERRY	OK	93	120	84	297	48	14256	Azenmokers
N4OGW	TOR	MS	89	111	94	294	45	13230	SSC #2
WQ5L	RAY	MS	123	132	9	264	49	12936	
K5WA	BOB	TX	106	110	53	269	46	12374	Austin Powers
K5TR	GEO	TX	116	76	40	232	50	11600	
N5DO	*DAVE	TX	108	85	42	235	47	11045	Austin Powers
W5XX	MAL	MS	67	80	83	230	46	10580	
KG5U	**DALE	TX	119	32	36	187	40	7480	Austin Powers
WD7Z	*DAVE	NM	76	62	32	170	36	6120	Azenmokers
NO5W	*CHUCK	TX	74	49	34	157	35	5495	
NT5TU	*DENNIS	TX	92	40	3	135	37	4995	Austin Powers
N5CHA	*TODD	TX	29	71	12	112	36	4032	
KC5R	**AL	LA	48	51	11	110	35	3850	
W6EEN	CAT	CA	150	147	81	378	54	20412	SCCC #1
K6LA	KEN	CA	160	133	53	346	53	18338	SCCC #1
N6TV	JIM	CA	154	143	61	358	51	18258	NCCC #1
N6MJ	CAT	CA	151	128	78	357	50	17850	SCCC #1
N6AN	CAT	CA	143	120	71	334	53	17702	SCCC #1
N6RO	JIM	CA	134	128	60	322	54	17388	NCCC #1
K6NA	CAT	CA	152	87	74	313	51	15963	SCCC #1
N6AA	DICK	CA	157	123	43	323	49	15827	SCCC #1
AC6T	STEVE	CA	110	132	64	306	50	15300	SCCC #1
AE6Y	JIM	CA	124	119	46	289	51	14739	NCCC #1
N6XI	JIM	CA	134	129	41	304	48	14592	NCCC #2
W6OAT	*JIM	CA	127	139	29	295	49	14455	NCCC #2
K6XX	JIM	CA	124	117	60	301	48	14448	NCCC #1
W6JPL	MIKE	CA	130	95	68	293	49	14357	SCCC #1
NI6T	JIM	CA	134	87	45	266	51	13566	NCCC #1
W6RGG	JIM	CA	118	109	25	252	51	12852	NCCC #1
AD6E	JIM	CA	129	94	38	261	49	12789	NCCC #2
W6TK	DICK	CA	118	87	47	252	46	11592	SCCC #1
K2KW	*JIM	CA	114	102	14	230	49	11270	NCCC #2
N6PN	*JIM	CA	104	75	47	226	47	10622	NCCC #1
N6ZFO	*JIM	CA	116	65	44	225	45	10125	NCCC #1
K6CTA	JIM	CA	118	67	36	221	45	9945	NCCC #2
N6NF	TOM	CA	118	52	51	221	45	9945	
K6LRN	JIM	CA	87	86	41	214	44	9416	NCCC #2
W6MVW	DICK	CA	102	87	10	199	45	8955	SCCC #2
W0YK	JIM	CA	98	90	0	188	46	8648	NCCC #2
KU6J	JIM	CA	96	68	35	199	42	8358	NCCC #1
K6III	JIM	CA	100	27	32	159	42	6678	
W6EU	JIM	CA	118	35	0	153	38	5814	NCCC #2
AD6TF	JIM	CA	79	30	17	126	36	4536	NCCC #3
ND2T	*JIM	CA	62	46	20	128	34	4352	NCCC #3
W6IXP	JIM	CA	61	28	22	111	39	4329	NCCC #2
NE6I	*DENNIS	CA	95	2	0	97	38	3686	SCCC #2
K6EY	*BECKY	CA	45	46	11	102	33	3366	SCCC #2
W6YL	*JIM	CA	46	47	7	100	31	3100	NCCC #3
WA6PX	*JIM	CA	37	29	5	71	32	2272	

Call sign	Name	QTH	20	40	80	QSO	Mult	Score	Team
K6DGW	*JIM	CA	27	18	17	62	24	1488	NCCC #2
W1HDO	KEN	CA	43	3	0	46	21	966	
K6MI	*JIM	CA	16	10	4	30	14	420	
N6TR	CAT	OR	172	142	79	393	52	20436	CPC
K6LL	CAT	AZ	146	127	61	334	48	16032	SCCC #1
K7RI	*DAN	WA	149	111	37	297	53	15741	CPC
KY7M	LEE	AZ	128	104	81	313	47	14711	Azenmokers
W7WA	DAN	WA	133	113	54	300	49	14700	CPC
N0AX	*CAT	WA	145	113	32	290	50	14500	CPC
K7NV	JIM	NV	110	120	43	273	49	13377	NCCC #1
K4XU	*DICK	OR	121	110	46	277	47	13019	
W7UQ	*CAT	ID	149	87	47	283	46	13018	CPC
W7TTT	JIM	NV	83	114	40	237	49	11613	
N7LOX	*BRIAN	WA	146	84	20	250	44	11000	CPC
NC7J	**BOB	UT	101	96	38	235	45	10575	
K8IA	*BOB	AZ	95	87	39	221	47	10387	
KL2A	*CAT	WA	133	67	23	223	45	10035	CPC
N7WA	*CAT	WA	115	71	28	214	43	9202	CPC
KL7WV	TIM	AK	105	11	0	116	35	4060	
WC7S	**DALE	WY	26	16	3	45	22	990	
N8EA	JOE	MI	100	124	107	331	52	17212	MRRC
K8MR	JIM	OH	109	128	72	309	52	16068	MRRC
N8AA	*JOHN	OH	93	94	78	265	49	12985	
W8KW	*TED	MI	74	75	50	199	45	8955	
K8JQ	STEVE	WV	64	62	61	187	38	7106	
K9TM	TIM	OH	45	54	50	149	38	5662	MRRC
K8JM	*JOHN	MI	25	75	25	125	37	4625	MRRC
N4ZR	CAT	WV	0	79	28	107	35	3745	SSB #3
W8WTS	*JIM	OH	13	1	33	47	27	1269	
AG9A	CAT	IL	110	164	78	352	52	18304	SMC-Cat #1
N9RV	PAT	IN	127	149	90	366	49	17934	SMC-Cat #1
K9PG	CAT	IL	99	166	76	341	52	17732	SMC-Cat #1
K9NW	CAT	IN	102	139	98	339	52	17628	SMC-Cat #1
W9RE	CAT	IN	100	105	103	308	50	15400	SMC-Cat #1
N9CK	CAT	WI	81	106	101	288	49	14112	SMC-Cat #1
K9ZO	CAT	IL	89	100	70	259	54	13986	SMC-Cat #2
KA9FOX	CAT	WI	73	107	85	265	52	13780	SMC-Cat #1
K9BGL	KARL	IL	103	115	57	275	49	13475	SMC-Cat #3
WT9U	CAT	IN	68	103	92	263	50	13150	SMC-Cat #2
KJ9C	*CAT	IN	91	95	76	262	48	12576	SMC-Cat #3
K9MMS	*CAT	IL	93	92	71	256	49	12544	SMC-Cat #2

Call sign	Name	QTH	20	40	80	QSO	Mult	Score	Team
KG9X	CAT	IL	98	105	58	261	48	12528	SMC-Cat #2
WI9WI	CAT	WI	61	102	61	224	45	10080	SMC-Cat #2
K9SD	CAT	IL	38	130	56	224	42	9408	
WA9IRV	CAT	WI	74	71	67	212	44	9328	SMC-Cat #2
WX9U	*CAT	IL	48	86	88	222	41	9102	SMC-Cat #2
K9KM	*HOWIE	IL	51	90	32	173	48	8304	
N9JF	*CAT	IL	86	59	32	177	43	7611	SMC-Cat #3
KG9N	CAT	IL	9	3	44	56	24	1344	
N2IC	STEVE	CO	154	151	84	389	52	20228	GMCC
WD0T	CAT	SD	115	124	108	347	47	16309	SMC-Cat #1
K0SR	STEVE	MN	98	127	83	308	50	15400	
KO0U	CAT	MO	112	109	76	297	48	14256	
WO4G	CAT	CO	120	96	62	278	49	13622	SSB #3
WB0O	CAT	ND	122	101	77	300	45	13500	SMC-Cat #1
N0AT	*RON	MN	79	111	57	247	46	11362	
NA0N	*PAT	MN	92	106	55	253	43	10879	
W0ETT	*KEN	CO	122	84	13	219	45	9855	GMCC
K0BJ	*JON	KS	70	57	60	187	38	7106	GMCC
W0UY	CAT	KS	54	80	26	160	42	6720	SMC-Cat #3
K4IU	*FRED	MN	59	53	36	148	42	6216	
N0AV	CAT	IA	79	49	0	128	42	5376	SMC-Cat #3
W8TM	**PAUL	NE	0	116	0	116	41	4756	
KT0R	DAVE	MN	23	60	37	120	35	4200	
AC0W	*BILL	MN	33	70	4	107	36	3852	
N0AC	*BILL	IA	15	19	20	54	31	1674	
VE3EJ	JOHN	VE3	99	90	92	281	46	12926	
VE5SF	*CAT	VE5	106	119	12	237	49	11613	
VE3NE	*LALI	VE3	106	43	71	220	48	10560	
VE3KZ	BOB	VE3	82	81	44	207	48	9936	
VA3NR	CHRIS	VE3	50	83	40	173	40	6920	
VE3IAY	*RICH	VE3	54	54	60	168	39	6552	
VE2AWR	*CAT	VE2	49	77	26	152	39	5928	
VE3SMA	*STEVE	VE3	22	79	0	101	34	3434	
VE4XT	*KELLY	VE4	38	42	6	86	32	2752	
VE2XAA	*ALEX	VE2	29	12	33	74	35	2590	
VE3KP	*KEN	VE3	8	21	40	69	30	2070	
VE4YU	*ED	VE4	52	18	2	72	27	1944	
VE7IN	EARL	VE7	20	6	3	29	19	551	
XF1K	*RAY	XE	101	57	41	199	43	8557	SCCC #2
ZF1DZ	YURI	ZF	82	79	19	180	45	8100	
LU1FAM	LUC	LU	74	18	0	92	35	3220	

Records

QTH	Date	Call sign	QSO	Mults	Score
CO	Feb-2003	N2IC	389	52	20,228
IA	Sep-2000	N0NI (AG9A)	331	43	15,093
KS	Sep-1982	K0VBU	231	42	9,702
MN	Feb-2003	K0SR	308	50	15,400
MO	Sep-1996	K4VX/0 (WX3N)	332	46	15,272
ND	Feb-2002	WB0O	318	47	14,946
NE	Feb-1991	KV0I	204	34	6,936
SD	Feb-2003	WD0T	347	47	16,309
CT	Feb-2003	K1KI	356	50	17,800
MA	Feb-2003	K5ZD	365	54	19,710
ME	Sep-1988	K1KI	218	41	8,938
NH	Feb-2003	K1DG	331	50	16,550
RI	Feb-2002	KI1G	310	47	14,570
VT	Sep-1999	W2GD	258	46	11,868
NJ	Feb-2003	N2NT	380	51	19,380
NY	Feb-2002	K2UA	321	50	16,050
DE	Sep-1989	KN5H/3	272	46	12,512
MD	Sep-1989	W3LPL	310	47	14,570
PA	Feb-2003	AA3B	320	50	16,000
AL	Feb-2000	K4NO	273	47	12,831
FL	Feb-2003	N2NL	357	55	19,635
GA	Feb-2003	K4AAA (W4AN)	402	53	21,306
KY	Sep-1998	K4LT	281	44	12,364
NC	Feb-2002	NY4A (N4AF)	341	48	16,368
SC	Sep-2002	W4OC	298	44	13,112
TN	Feb-2002	W4PA	388	49	19,012
VA	Sep-1989	K7SV	300	52	15,600
AR	Feb-2000	K5GO	278	50	13,900
LA	Feb-1995	W5WMU (K5GA)	306	48	14,688
MS	Feb-2000	WQ5L	317	49	15,533
NM	Feb-2003	N6ZZ	351	52	18,252
OK	Feb-2003	N5OT	338	49	16,562
TX	Feb-2000	N5TJ	381	52	19,812
CA	Feb-2003	W6EEN (N6RT)	378	54	20,412
AK	Feb-2000	KL9A	202	47	9,494
AZ	Feb-2000	K6LL	364	50	18,200
ID	Feb-2003	W7UQ (KL9A)	283	46	13,018
MT	Feb-1998	K7BG	273	43	11,739
NV	Feb-2000	K7BV	290	50	14,500
OR	Feb-2003	N6TR	393	52	20,436
UT	Sep-1991	K6XO	263	44	11,572
WA	Feb-2003	K7RI (K7SS)	297	53	15,741
WY	Sep-1999	K7KU (N2IC)	312	48	14,976
MI	Feb-2003	N8EA	331	52	17,212
OH	Feb-2003	K8MR	309	52	16,068
WV	Feb-2002	N4ZR	286	48	13,728
IL	Feb-2003	AG9A	352	52	18,304

QTH	Date	Call sign	QSO	Mults	Score
IN	Feb-2002	N9RV	370	52	19,240
WI	Feb-2000	K9AA (K9PG)	302	55	16,610
VE1	Sep-2000	VE9DX (K5NZ)	183	40	7,320
VE2	Sep-1988	VE2ZP	214	41	8,774
VE3	Feb-2000	VE3EJ	270	50	13,500
VE4	Sep-1993	VE4VV	237	40	9,480
VE5	Feb-2003	VE5SF	237	49	11,613
VE6	Feb-2000	VE6EX	228	43	9,804
VE7	Feb-2000	VA7RR	316	48	15,168
VY1/VE8	Feb-2000	VY1JA	36	22	792
4U1	Feb-1985	4U1UN (W2TO)	70	23	1,610
8P	Sep-2002	8P9JG (N5KO)	277	42	11,634
C6	Feb-1999	C6AKP	21	14	294
HH	Sep-1996	HH2AW	139	33	4,587
HI	Feb-1991	HI8DMX	40	19	2,430
HP	Feb-2000	HP1AC	64	30	1,920
KP4	Feb-2002	NP4Z	106	37	3,922
TG	Sep-2001	TG9/N5KO	150	42	6,300
V4	Feb-1996	V40Z (AA7VB)	54	23	1,242
VP2E	Feb-1996	VP2E/KJ4HN	68	30	2,040
VP9	Feb-1985	W6OAT/VP9	202	31	6,262
XE	Sep-1990	XE2XA (WN4KKN)	305	47	14,335
ZF	Sep-1992	ZF2KI (K1KI)	251	49	12,299
9A	Sep-2000	9A6XX	29	19	551
CT	Sep-1998	CT1BOH	225	40	9,000
EA8	Feb-1994	EA1AK/EA8	36	21	756
F	Sep-1990	F/N6TR	196	38	7,448
G	Feb-2002	G4BUO	160	40	6,400
HC8	Feb-2000	HC8N (N5KO)	271	52	14,092
I	Sep-1998	IK0HBN	100	35	3,500
JA	Feb-1991	7J1AAI	13	9	117
KH6	Sep-1981	KH6NO	121	30	3,630
LU	Feb-2003	LU1FAM	92	35	3,220
LY	Sep-2000	LY4AA	163	38	6,194
OH	Sep-1998	OH1NOA	56	22	1,232
PY	Sep-1980	PY8ZPJ	29	14	406
UA9	Feb-2000	RU0SN	15	13	195
UN	Sep-2000	UP6F	13	10	130
VK	Sep-1994	VK5GN (N6AA)	48	22	1,056
ZD8	Sep-1990	ZD8Z (N6TJ)	228	43	9,804
ZS	Feb-2000	ZS1ESC (N6AA)	51	18	918

Highest multiplier: Feb-2000	55	K9AA (K9PG)
Highest QSO total: Feb-2003	402	K4AAA (W4AN)
Highest score: Feb-2003	21,306	K4AAA (W4AN)
Highest team score: Feb-2002	163,373	SCCC #1
Logs received: Feb-2003	202	
Number golden logs: Feb-2000	15	
Number logs >=300: Feb-2003	52	

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