NCJ

NATIONAL CONTEST JOURNAL

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September/ October 1999

Volume 27 Number 5

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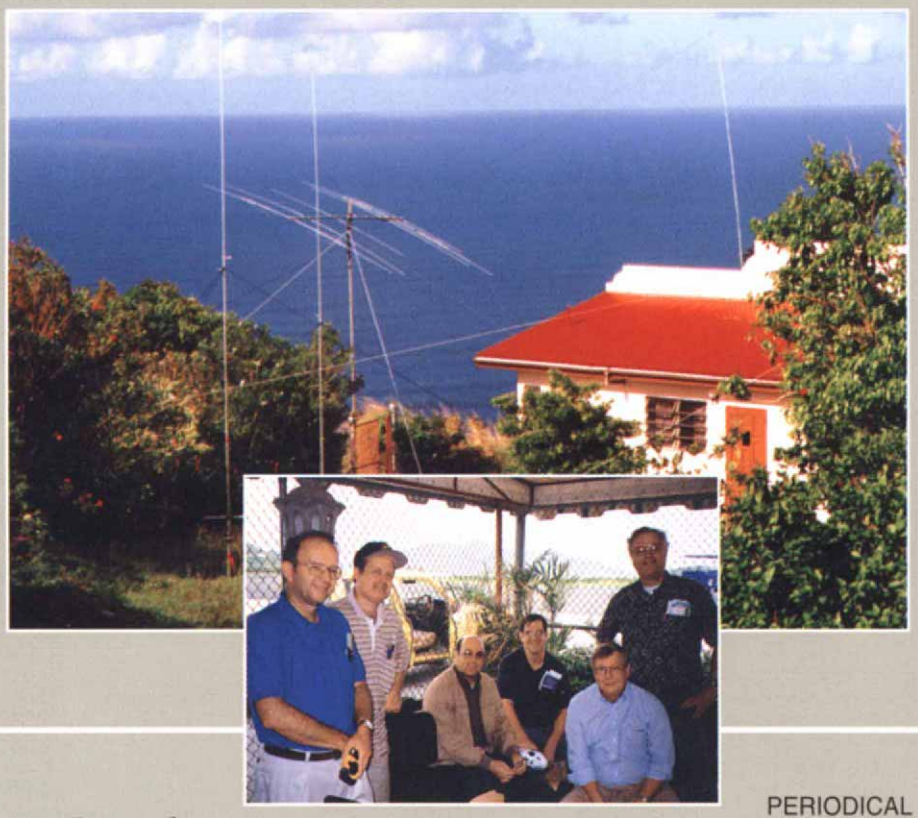

For 1998, the Cinco Nueve Contest Group chose the British Virgin Island of Tortola as the destination for their annual CQ WW SSB DXpedition.

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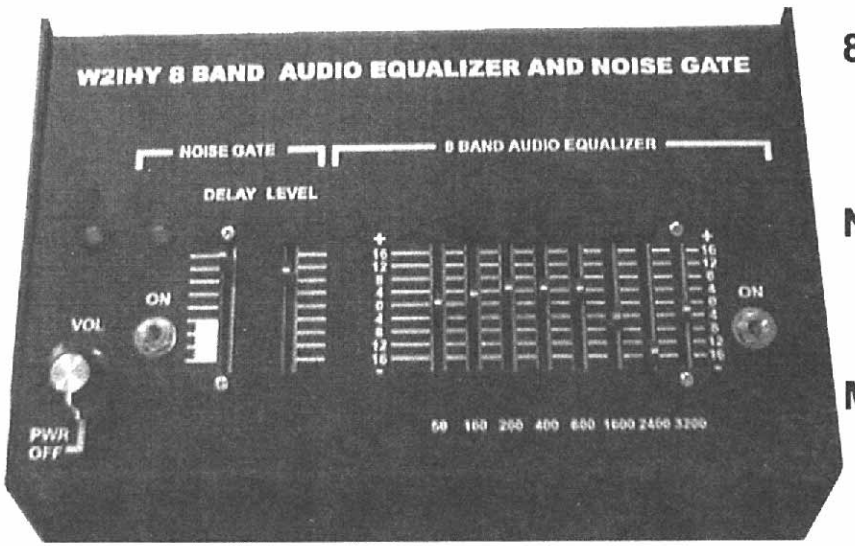

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Editor
Dennis Motschenbacher, K7BV
4357 Appollonio Way
Carson City, NV 89704
k7bv@aol.com

NCJ WWW Page
Bob Applegate, K2UT
http://www.vramp.net/~ncj/

ARRL Officers
President: Rod Stafford, W6ROD
Executive Vice President:
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Contributing Editors
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Bruce Horn, WA7BNM—Contest Calendar
ARRL CAC Representative
Lew Sayre, W7EW, PO Box 3110, Salem, OR
lew@teleport.com
North American QSO Party, CW
Bob Selbrede, K6ZZ, 6200 Natoma Ave,
Mojave, CA 93501
K6ZZ@ccis.com
North American QSO Party, Phone
Bruce Horn, WA7BNM
4225 Farmdale Ave, Studio City, CA 91604
bhorn@hornucopia.com
North American QSO Party, RTTY
Ron Stailey, K5DJ
504 Dove Haven Dr, Round Rock, TX 78664
k5dj@contesting.com
North American Sprint, CW
Mark Obermann, AG9A
cwsprint@contesting.com
North American Sprint, Phone
Rick Niswander, K7GM, PO Box 2701,
Greenville, NC 27836
niswanderf@mail.ecu.edu
Advertising Information Contact:
John Bee, N1GNV, ARRL; tel 860-594-0200;
fax 860-594-0259;*ads@arrl.org*

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Editorial

Dennis Motschnebacher, K7BV
k7bv@aol.com

Since taking on this challenging and rewarding responsibility, I have come to recognize that the initials *NCJ* represent far more than just the name of a magazine. They also represent five contests. But even larger than those material things, *NCJ* represents a collective approach to Amateur Radio contesting by thousands of enthusiasts. Those who choose to "participate" in the *NCJ* end up being the true soul of those initials.

The *NCJ* path will continue to go wherever the majority of the participants guide it through their many different volunteer contributions—including simply choosing to support the overall effort by paying a subscription fee.

The regular columnists, the contest managers and the support personnel at the ARRL have gelled into a rather smooth running machine—making that part of my job as editor relatively easy. The new spark in the magazine now draws even more guest writers and provides a nice flow of quality material, making the more difficult task of gathering an adequate supply of interesting articles quite a bit easier than it was when I first came aboard.

I now feel that it is appropriate for me to focus on tightening up a few other aspects of the *NCJ*'s image.

Article Timing

I will now turn my attention towards securing time-sensitive articles from our feature article authors a couple of months earlier—a goal that I truly do not know to be possible—but one that is certainly worth pursuing. Supplying those time-sensitive articles to the *NCJ* readership is particularly challenging when you consider that we offer two delivery options. This puts the magazine in the hands of these two groups of subscribers on significantly different dates.

This matter becomes even more of an issue when some of the readers forget they signed up for the slower service and cannot find a logical reason why their copy of *NCJ* arrives a couple weeks after their buddy's down the street.

The *NCJ* Contests Awards Program

The five contest manager volunteers collectively work over 1,000 hours a year administering their respective NAQP and Sprint contests. Most contesters do not know that when they receive a certificate or plaque, the cost of mailing and protecting that award with a large envelope or shipping box currently comes directly out of the pocket of the contest manager. Those same gentlemen have also frequently (and quietly) paid for certificate production costs—although the ARRL has occasionally assisted with the printing. I personally find this situation intolerable.

The NAQP and Sprint contests are not ARRL contests so don't even bother going there, okay? The various ARRL contest programs do not support these contests and as long as I am Editor, they won't. They have flourished in the independent environment they evolved from and should remain there. But, gang, it is time for us to better provide for the expanding needs of these contests so that they can continue to grow.

The *NCJ* magazine is basically a "break even" venture—we do not have profits we can dip into to cover the certificate, plaque and mailing costs. Therefore, we will be embarking on an aggressive program to find solid sponsorship for the contests from a variety of alternative sources. Contesters represent a significant source of revenue for several companies. We need not blush when we request a few bucks for the support of the NAQP and Sprint awards programs.

The *NCJ* Contests Committee

You didn't know this group existed, did you? Well, it didn't until a few weeks ago. As stated above, the popularity of the *NCJ* contests continues to grow at a steady rate. We now have a large number of participants who have a special place in their hearts for these contests and we respect that fact. The days of an individual contest manager being stuck with the burdensome responsibility of deciding on matters like rules or date changes are gone. The *NCJ* volunteers who administer these contests for you recognize that.

We have formed *The* NCJ *Contests Committee* to deal with significant matters of concern with regards to the *NCJ* contests. The committee is made up of the five NAQP and Sprint contest managers. The Editor of the *NCJ* sits on the committee—but serves only in a non-voting advisory role.

The managers now will have the benefit of the collective wisdom of the group when deciding on major issues. The entire committee will vote on matters such as rule and date changes. We aren't going to get anal about this—but we do feel that the committee will serve a very useful purpose for both the individual managers *and* the participants. We will soon provide you with a way of efficiently communicating with them.

More often then not, your recommendations and opinions now consume bandwidth on one or more of the many club and contest reflectors. I am not sure that this is a fair use of those facilities since not all list subscribers share our passion for these particular operating events. My next topic addresses this issue—an alternative avenue for conveying your recommendations and opinions to the contest managers.

The *NCJ* Web Site

Bob, K2UT, sponsors the Web site that the *NCJ* enjoys today. Without Bob's efforts, we would not have a Web site. However, Bob is a very busy business owner and has repeatedly told me that while he will do most anything we ask him to do with the site, he cannot take on the responsibility for its creative development.

Therefore, it is my decision to add one additional member to the *NCJ* staff—a qualified person to take charge of transforming our site into one that is vastly more informative and interactive.

Several knowledgeable individuals have already offered some very exciting ideas for improving the *NCJ* Web site. Unfortunately, each and every one of these people is already chin deep in other volunteer activities in our contest community. By the time you read this, we should have a new volunteer on our staff whose assignment will be to convert those ideas into reality.

73, Dennis Motschenbacher, K7BV

Our Cover

For 1998, the Cinco Nueve Contest Group, a loose-knit group of Northwestern contestors, chose Tortola, the British Virgin Islands for their annual CQ WW SSB contest DXpedition.

The *Lloyd Hill Villas*, located about 1,200 feet above sea level, provided a comfortable, scenic and effective site and offered a clear shot to both Europe and North America.

The gang bides their time at the departure lounge of East End Beef Island Airport as they wait to board their flight home. From left to right—Bob, W7YAQ; Ron, WJ7R; Al, K7AR; Lee, N7NU; Jim, K9JF and Mark, N7MQ. See *Contesting from the British Virgin Islands* for the story behind the VP2V/K7AR contest operation. ■

Making Choices for the CQ WW—a Contester's Dilemma

NCJ VK Regional Contributing Editor
Steve Ireland, VK6VZ
sire@omen.com.au

"The loneliness of the long distance Single-Band contester."

We all have to make choices from the moment we are born. Initially they are simple: "Shall I have a drink of milk from Mum now or later?" However, a lot of choices seem to get harder as we get older. The hardest choices to make, in my case, are those that concern the CQ WW contests.

Now some contesters agonize over what equipment or antenna to use. For me, that's easy. I have two rigs of which one is much older and less agile than the other—no choice in other words. And there is only one tower with one TX/RX antenna for each band, so there is definitely no choice there.

Another CQ WW decision that I can make easily right now is whether to compete All-band or Single band. Being an exhausted working father of two children aged under four, that's a real easy one too—single banding is the only way to keep my sanity and strength, and the only way to enter the contest competitively. That is until the kids get big enough for us to do a "Multi-single" entry (and don't think I don't dream about it already...).

Which leads me to my real problem choice—which band do I operate on? My favorite band is 160 meters and entering the contest on this one gives me the best chance to work a few of the new countries that inevitably turn up on topband for the big event. On the other hand, my best band is 40 meters, where I spent a lot of time and effort in putting up a killer antenna before I got seduced by 160 meters. And 40 meters is where I have on several occasions tried to break the Oceania record, currently held by the late, great Peter Watson, ZL3GQ, one of my heroes.

This "which band?" situation has now become something of a "menage-a-trois." In my youth as a SWL, I loved 10 meters, and with the stirrings of the sunspots (and the fact that I have been off the air in the two preceding cycle peaks) my heart has once again started to turn towards my old flame.

Now, I can't believe this, but the choice is starting to fill my waking and sleeping time. I really don't know what to do. Today, I sought counsel from an older contester and friend who has been a strong influence on my operating habits. His advice was to use my head, and take the chance to have another crack at the 40-meter Oceania record before all the little pistol contesters desert the band next year for the delights of 10 meters.

However, my heart says "*CQ 160*," but then it jumps and goes "*CQ 10 meters*." How does that Peter Sellers song go? "Boompity Boompity Boompity Boompity Boompity Boompity Boo-boo-boom, goodness gracious me. Oh Doctor, I'm in trouble... "

So here I am with this dilemma and the big day is getting nearer all the time. To make matters worse, I now have a local rival (*and so-called friend—huh!*) who wants to take the 40-meter Oceania record for his own. What makes matters worse, is that he once held this very record.

What chance do I stand? My older contesting friend counsels "Stand and fight on 40 meters for your chance to take the record." However, my fearful heart tells me to stick with 160 meters and take those (probably few) new countries that come along.

This is torture and it is only going to get worse as the days tick away. I won't bore you any longer with my problems.

All you care about is getting a QSO with Zone 29 on as many bands as possible—and you don't know the agony that is caused when in the midst of a 40-meter pileup that HB0 asks me for a QSY to 160 meters. Choking back the tears I send "SRI SB ONLY, PSE SEE U AFTER THE TEST," only to be greeted by silence as the station disappears, never to be heard again. Of course, this is only a dream, well, nightmare anyway—one I currently have nightly.

Wherever you hear me, on whatever band, I hope you now realize the pain and suffering that went on before I got there. Life is full of hard choices—and believe me, I will have made one. Unless, of course, I abandon the whole CQ WW idea the night before, leave the radio shack and the ether alone and spend my nights on the ersatz pleasures of the Internet instead.

See you in the contest—probably somewhere.

VK6VZ finally made a decision and chose 40 meters in the 1998 CQWW CW. Steve missed the Oceania 40-meter Record by a couple of hundred QSOs, but believes he broke the Australian one. Thoughts of the A61 and Zone 2 stations he missed by staying away from 160 meters are currently keeping him awake at night...—BV. ■

The REAL Winners of the 1998 ARRL November Sweepstakes Revealed

Dan Henderson, N1ND
ARRL Contest Branch Manager
n1nd@arrl.org

The final scores have been tabulated, and the pats on the back have been passed around. We all know the "Kings" of the 1998 ARRL November Sweepstakes: W4PA, N5TJ, K1TO and K4OJ on CW and N7VY, VE4GV, WP3R (KE3Q, op) and KW8N on Phone. These guys are quite accomplished operators in their own right—champions to be studied and emulated in upcoming events.

But what if I tell you that the REAL scores shows none of the above were the champions of Sweepstakes in 1998?

Now before you decide to tar and feather the Contest Branch Manager, rest assured that these skilled operators were in fact the individual winners. What I am referring to are the "Check Champions" of Sweepstakes. Which *year* of operator checks produced the highest scores for the 1998 Sweepstakes?

The 1998 CW Sweepstakes champions are the venerable class of 1977. Operators licensed in 1977 (those using "77" as their check) racked-up an outstanding 3,717,334 points, easily outdistancing the Class of 1958 by about 170,000 points. For the 1998 Phone Sweepstakes, the Class of 1969 edged out the Class of 1957 (3,462,240 to 3,418,268) to lay claim to the Phone Championship.

Who reigns supreme in the Combined 1998 Sweepstakes Championships? None other than the Class of 1977. In addition to their first place victory in the CW portion, the stalwart contesters of '77 finished in third place on the Phone side of the ledger and were the only year to top 7 million points in the combined race.

Six classes cracked the Top Ten in both the CW and Phone portions of Sweepstakes. In addition to 1977, the ops of 1958, 1962, 1959, 1969 and 1957 found their way to the top tier for both modes. Of the actual individual winners, only K1TO and VE4GV—both of the class of '72—were members of a class finishing in the Top 10 Overall competition.

A total of 1,297 CW scores were submitted accounting for 76,411,560 points. On the Phone side, 1,536 scores totaling 89,363,960 points found their way into the ARRL Sweepstakes databases for a grand total of 165,775,520 points. Remember that not everyone who participates submits their scores and logs. For instance, the skilled log-checkers had over 5,000 call signs in their master database for the Phone

(Continued on page 7)

The Order of Finish of the Combined 1998 ARRL November Sweepstakes by Check Year

Check Year	*Total of all Scores*	*CW Score*	*Number of CW Ops*	*Phone Score*	*Number of Phone Ops*
77	7,065,988	3,717,334	54	3,348,654	56
62	6,664,200	3,326,910	49	3,337,290	43
69	6,416,578	2,954,338	46	3,462,240	49
57	6,335,476	2,917,208	47	3,418,268	52
59	6,244,408	3,244,202	51	3,000,206	41
58	6,119,918	3,541,262	44	2,578,656	38
73	5,216,392	2,648,166	31	2,568,226	21
63	4,940,984	2,255,578	35	2,685,406	31
72	4,842,518	2,891,786	32	1,950,732	33
56	4,791,420	2,716,148	35	2,075,272	30
67	4,603,564	2,704,154	40	1,899,410	28
60	4,587,088	2,680,402	36	1,906,686	28
61	4,431,876	2,342,630	40	2,089,246	34
76	4,401,764	1,765,406	23	2,636,358	39
54	4,054,752	2,328,420	36	1,726,332	33
55	3,812,322	1,989,256	30	1,823,066	24
52	3,716,396	1,648,438	24	2,067,958	21
71	3,601,974	1,632,770	21	1,969,204	31
65	3,579,720	1,736,276	29	1,843,444	23
53	3,486,814	1,845,520	31	1,641,294	20
92	3,266,288	722,108	25	2,544,180	54
70	3,250,428	1,747,690	24	1,502,738	20
68	3,175,768	1,523,536	25	1,652,232	28
78	3,163,366	1,309,126	24	1,854,240	33
93	3,149,818	573,316	24	2,576,502	62
79	2,905,416	1,488,748	24	1,416,668	24
95	2,832,568	551,610	24	2,280,958	53
89	2,822,350	744,238	22	2,078,112	37
74	2,781,350	1,229,580	19	1,551,770	24
66	2,631,926	1,887,154	25	744,772	19
64	2,609,528	1,305,596	24	1,303,932	26
91	2,475,688	569,504	17	1,906,184	49
90	2,406,902	749,376	15	1,657,526	32
81	2,110,194	888,562	16	1,221,632	15
75	2,089,258	1,113,604	18	975,654	19
94	1,960,400	293,834	16	1,666,566	55
96	1,919,312	610,108	22	1,309,204	44
97	1,774,404	273,688	11	1,500,716	35
88	1,476,172	381,660	9	1,094,512	19
86	1,347,690	311,832	8	1,035,858	19
48	1,319,414	607,490	13	711,924	13
80	1,147,478	368,758	10	778,720	18
85	1,088,672	349,752	10	738,920	15
51	1,018,606	401,440	8	617,166	10
84	983,962	373,010	5	610,952	15
82	851,074	244,246	8	606,828	13
87	793,666	363,020	11	430,646	10
98	696,424	142,652	8	553,772	19
50	691,972	302,678	8	389,294	5
83	606,780	266,174	6	340,606	11
34	601,072	399,314	9	201,758	2
49	578,472	250,466	4	328,006	7
37	528,114	369,956	9	158,158	1
47	507,182	307,296	5	199,886	7
36	497,254	208,534	6	288,720	6
23	487,462	220,916	2	266,546	1
31	470,908	204,000	5	266,908	5
41	457,848	410,860	6	46,988	3
24	376,678	127,512	1	249,166	1
38	311,402	168,622	4	142,780	4
35	304,052	166,710	6	137,342	8
40	273,830	168,884	8	104,946	5
21	270,206	94,668	2	175,538	1
39	251,336	22,656	2	128,680	2
13	243,546	59,792	1	183,754	1
30	241,958	107,076	2	134,882	2
16	227,184	26,840	1	200,344	1
19	178,574	55,792	2	122,782	2
12	162,684	12,426	1	150,258	1
29	143,976	28,320	1	115,656	1
46	132,226	117,568	2	14,658	2
32	118,544	76,496	2	42,048	1
44	81,320	81,320	1	0	0
33	32,760	32,760	1	0	0
22	23,424	0	0	23,424	1
42	12,482	12,482	2	0	0
Totals	165,775,520	76,411,560	1,297	89,363,960	1,536

Internet Tools for Contesters

Steve Brandt, N7VS

Warning! A new addiction is sweeping the world. Once caught in its web (pun intended) there is no known escape or cure. Some have even sought professional help for relief. Radio amateurs have been known to be among its most common victims. I'm not referring to some new chemical substance—this menace is far more insidious than that—I'm talking about the Internet.

Many radio amateurs scoff at the idea of embracing the Internet. "*The Internet is not Amateur Radio…* " they retort, "*this communications system is primarily based on landlines!*" Relax, the Internet is not likely to replace Amateur Radio anytime soon. But it definitely has its place, and—when used in moderation—has proven to be a very valuable additional communications mode.

This article is intended for the radio amateur who may be an experienced contester, but is just starting out on the Internet. I will attempt to briefly explain how the average contester can benefit from its use and share with you some information on a number of Web sites that I have personally visited and that I feel you'll find useful.

Attempting to catalog *all* the Web sites that might be of value to contesters is a job beyond the ability of even a full-time professional "surfer." The World Wide Web is a dynamic system—Web sites come and go almost daily.

It's important to keep in mind that the information that you encounter on the Internet may not always be accurate. It is wise to retain a healthy degree of skepticism. You wouldn't believe everything you heard on the air or read in the media, would you?

The Web sites mentioned here are only a representative sample of ones that I have visited and found relevant. No claim for completeness is made. If your favorite site has been omitted, rest assured it was not intentional.

Let's Take the Plunge

Our first stop on our World Wide Web tour for the contester will be **http://www.arrl.org/**. This is the site of the American Radio Relay League. To gain access to any Web site, type the address (shown in this article in bold) in the proper box of your Internet browsing software. (Some browsers will allow you to leave off the "**http://**" prefix.) The League's Web site contains a wealth of information on nearly all aspects of Amateur Radio.

Once your browser locates the Web site, the "homepage" will appear. A homepage is the main entrance point of a Web site and is the first page displayed after entering the site.

Steve Brandt, N7VS

The portion of this site that is especially interesting to contesters is the ARRL Contest Branch page. You can locate this by accessing the site index and linking to this page from the alphabetical listings. You can also go directly to it by typing **http://www.arrl.org/contests/** into your browser.

Here, among other things, you'll find the rules for ARRL contests and the IARU HF World Championship, a contest calendar and information about the League's plaque programs. You can download rules and forms and view results from recent ARRL contests. Logs for any ARRL contest can now be e-mailed directly to contest-specific e-mail addresses set up by HQ for this purpose. Verification of receipt of logs is also possible right on the Web.

Scrolling through the League's site index and investigating the linked pages will help you become familiar with the incredible amount of information available here. Read the *ARRL Letter*, listen to the *ARRL Audio News* in *RealAudio*, visit the Technical Information Service page, locate a manufacturer's or advertiser's address and contact information, calculate your grid square, study a band plan, browse through their publications catalog—the list goes on and on.

A "Members Only" Web site—**http://www.arrl.org/members-only/**—was added on September 1, 1998. As the name implies, this site contains additional information available only to members of the ARRL. To gain admittance, on your first visit you "register" using your call sign and membership number (printed on your *QST* mailing label) and select a password.

Here you'll find an on-line Web magazine—*The ARRLWeb Extra*. This electronic supplement to *QST* magazine is loaded with up-to-the-minute Amateur Radio related news, feature articles and even previews of upcoming Product Reviews. You'll also find a Product Review Archive where you can view all the reviews that have appeared in *QST* since January 1980 and the propagation charts that used to appear monthly in *QST*. Additionally, there's an on-line search engine for determining the publication dates of previous *QST* and *QEX* articles. (For more information, see pages 30 and 31 of the October, 1998 issue of *QST*.)

Organizations and Publications

Other IARU societies also have interesting Web sites. Examples include: **http://www.rsgb.org/**, the Radio Society of Great Britain; **http://www.rac.ca/**, Radio Amateurs of Canada; **http://www.darc.de/**, Deutscher Amateur Radio Club e.V.; and **http://www.jarl.org/**, the Japan Amateur Radio League.

Many of the major contest clubs have their own Web sites. Typical of these are: **http://www.pvrc.org/**, the Potomac Valley Radio Club; **http://www.frc-contest.org/**, the Frankford Radio Club; **http://www.yccc.org/**, the Yankee Clipper Contest Club; and **http://www.wwdxc.org/**, the Western Washington DX Club. All of these organizations have interesting club related information and links to other worthwhile Web sites.

Several major Amateur Radio publications maintain their own Web sites. The best known examples are **http://www.vramp.net/~ncj/**, *The National Contest Journal* and **http://www.cq-contest.com/**, *CQ Contest* magazine. Also noteworthy, but not quite as well known, is **http://www.wr6wr.com/**—*Worldradio*. Many fascinating Web sites have been identified in the pages of this publication, particularly in the past three years. It was the source for several of the sites mentioned in this article. I highly

recommend examining back issues for Web sites of interest.

The Supersites

Next, I would like to introduce you to some very popular Web sites that specialize in information primarily for contesters—the "Contest Supersites."

Probably the best known and most popular is **http://www.contesting.com/**. This site is billed as "the ultimate resource for Amateur Radio contesting news, articles, information, scores, tips, reviews, and much more." It does a fine job of backing up that claim.

Several amateurs who write regular contest columns for Amateur Radio publications report that they depend heavily on LA9HW's site. The address for this one is **http://home.sol.no/~janalme/hammain.html**. Here you'll find information about almost every known contest in the world, and links to many other related Web sites. OH2AQ's Web site, **http://oh2aq.kolumbus.com/dxs/**, is unique—it has a DX spotting feature. Just choose your favorite band, from 160 meters through 10 GHz, and you can instantly find out what's going on at any time of the day or night. You can even submit your own input. This feature is very popular with amateurs who do not have easy access to a local packet cluster. Another impressive site is operated by SK3BG—**http://www.sk3bg.se/contest/**.

I have spent many happy and enlightening hours surfing these pages.

Finding Your Way Back

About now you're probably thinking, "How do you keep track of all of these Web site addresses?" Memorizing them is not necessary. Desirable Web sites can be retained in a feature of your browser software called "bookmarks." To return to an interesting site that you have visited and bookmarked, you simply activate the feature and select the previously visited site from the list that you have created. This method also saves a lot of typing.

DXing and Special Interest Sites

DXers will want to visit W3UR's Daily DX Web site: **http://www.dailydx.com/**. Bernie also writes the *How's DX?* column in *QST*. This site contains lots of good information for both contesters and DXers. His links cover many areas of interest.

Bob Peschka, K7QXG, a well-known DXer in the Portland, Oregon area, maintains a Web site that many people, both amateur and non-amateur, will enjoy. In the Amateur Radio section, you'll find loads of useful information and links to several interesting contest and DX related sites. New information appears here frequently, so visit **http://www.pcez.com/~k7qxg/amateur1.htm/** often.

Many contesters are also active in special interest groups. Two good examples are Ten-Ten International and the Quarter Century Wireless Association. The Ten-Ten International Web site is **http://listserv.lehigh.edu/lists/tenten-l/**. You'll find the Quarter Century Wireless Association's Web site at **http://www.teleport.com/~qcwa/**. This site features loads of useful information. Have you ever wondered if your station complies with the Federal Communications Commission's new RF exposure regulations? On the bottom of the QCWA's homepage you'll find a link to the University of Texas RF Safety Calculator. Just type your station details into the boxes, click on the "calculate" button, and your answer will come back in a few seconds. County hunters will want to visit **http://www.countyhunter.com/**.

On-line Callbooks and the Reflectors

Even a contester has a need to visit an on-line callbook database—perhaps to locate the address to send the "green stamps" for that coveted QSL card. Unlike the old paper callbooks or their present CD ROM equivalents, these on-line listings are constantly being updated. You can easily find out what licenses were granted in the last week, or even investigate which call signs are available for vanity applications.

My personal favorites are **http://www.qrz.com/** and **http://www.wm7d.net/**. The QRZ site is even useful for finding out if someone has an e-mail address. WM7D's site is handy if you are a member of Ten-Ten International and want to look up someone's Ten-Ten number. Mark also provides links to foreign callbook databases and QSL manager lists and to several other sites of interest to amateurs and non-amateurs alike.

If you're passionate about any particular niches in our hobby, you may want to consider joining a related reflector or user's group. Topics cover a huge variety of subjects from antenna modeling to vintage gear. When you send an e-mail to a reflector, it is automatically sent to every individual that has subscribed to the reflector. A page on the AC6V Web site, **http://www.ac6v.com/pageae.html**, has information, including instructions for subscribing, for over 100 different reflectors. Also be sure to visit Rodney's homepage, **http://www.ac6v.com/**. His site contains a wealth of information, and links, treating nearly every topic of interest to radio amateurs.

I am saving these two Web sites for last because they don't fit into any of the previously listed categories. **http://www.qth.com** and **http://www.qsl.net**. These sites support an incredible variety of smaller sites maintained by individual amateurs who feel they have something to contribute. These smaller cities cover many subjects of interest and are frequently well worth visiting. A typical individual's address might look like **http://www.qth.com/~<*callsign*>**.

In Conclusion

In this article, I've attempted to show that the Internet is not a threat to Amateur Radio or merely a passing fad, but is a useful tool that is here to stay. You don't need the latest and greatest computer system nor spend a lot of money to get started.

I've filled you in on some of the Web sites I feel are definitely worth visiting. There's a tremendous amount of information on the Web that is of interest to contesters—considerably more than I could hope to cover in a single article (we've just barely scratched the surface). Web sites are constantly emerging and changing. The reader is encouraged to explore. Happy surfing.

I would like to thank Sandy Lynch, W7BX; Jim Yohe, KF7KY, and his wife Sue; Bob Deay, a would-be radio amateur; Bob Peschka, K7QXG; and my wife Caroline, KC6MZY, for their assistance with this article.

An expanded version of this article will be appearing on the NCJ *Web site,* **http//www.vramp.net/~ncj**, *shortly—BV* ■

The REAL Winners of the 1998 ARRL November Sweepstakes Revealed

Continued from page 5.

competition—only about 30% of which submitted scores. Similar numbers are found in the CW total.

This unscientific compilation of scores is skewed by a couple of factors. Remember that only one check year is given from a multi-op station. Ops from several years will be lumped into that one score. There are cases where an op may have been originally licensed in an earlier year, but used as their check the year of a subsequent issuing of a license or upgrade. Also, the number of people from a given year submitting scores will affect the scores for that year (the class of 1977 did have the highest number of logs submitted for both CW and Phone.)

So let the debate begin. What year truly has produced the "Champion" contesters? ■

Refurbishing Your Rohn TB-3 Thrust Bearing

Jim Idelson, K1IR

In In the last two weeks, I've refurbished two Rohn TB-3 thrust bearings. One was running very rough. The other was "sticking" at several points in its rotation. After refurbishing, they both run very smoothly. This procedure is only intended to help improve the operation of a reasonably "healthy" unit. If you find serious problems, like cracked castings, broken or missing ball bearings, extreme wear, or cross-threaded screws—please do the wise thing and replace it with a brand new thrust bearing.

Here's what you'll need:

1. A clear, well-ventilated, well-lighted workspace.
2. A 16 x 24 inch or larger tin baking sheet with edges (so you don't lose the ball bearings).
3. A rag for cleaning.
4. Mineral spirits for cleaning.
5. A 3/16-inch Allen key (preferably with a 6" handle and "rounded" end for insertion at an angle).
6. Miscellaneous filing tools (i.e. small hand files—both round and flat, and a Dremel tool with fine grinding capability).
7. Wrenches.

Procedure:

1. Remove all the bolts and nuts that are used to secure the bearing to the tower and the mast into the bearing.
2. OVER THE BAKING TIN, CAREFULLY remove the Allen setscrew located on the inside wall (where the mast goes through).
3. The ball bearings will begin to fall out of the setscrew hole. Rotate and lightly shake the bearing to help the ball bearings out of the hole.
4. The unit was built with 32 (THIRTY-TWO) ball bearings. Make sure you have them all! Set them aside.
5. Separate the top and bottom castings of the bearing.
6. Clean both castings and all the ball bearings with the rag and the mineral spirits or other grease-cutting cleanser.

Note: It is normal for some dirt and metal powder to accumulate. The bearing should not contain grease. This unit is designed to run dry.

7. Inspect the ball bearing races. Look for unusually worn areas, pitting and cracking. Try rolling a ball bearing in suspect areas to see if it will get "hung."
8. Using your filing tools, smooth out any rough areas so the ball bearing can roll without resistance.
9. Do this for both castings. Note that your mast will be pushing down on the upper casting. This will cause the bearings to press against the top of the race in the upper casting and against the bottom of the race in the lower casting. Pay close attention to these areas.
10. Make sure you look carefully at the area of the race in the upper casting near the setscrew. I found that wear in this area was causing one of the thrust bearings to stick.
11. Insert the set screw—don't cross-thread it! Adjust it to the point where a ball bearing can run across it smoothly. Note, from the insertion side, how far the setscrew is screwed in. Remove the screw and set it aside.
12. Reassemble the thrust bearing by holding the castings together and inserting the ball bearings back into the setscrew hole one at a time. You'll have to rotate and jiggle the unit to find space for the last 5 or 6 ball bearings. Do this over your baking tin so that *WHEN* (not *IF*) you drop a ball bearing, it falls in the tin, not in the air conditioning vent.
13. Replace the setscrew. Insert it until it is at the point you noted in Step 11. It should be roughly flush with the inside wall of the upper casting. Do be careful not to cross thread the setscrew.
14. Now it's time to give the bearing a spin. It should run much smoother, and should not "stick" at all.
15. If you think the bearing could operate a little smoother, try adjusting the setscrew in or out a bit. Remember—the ball bearings must go by the setscrew smoothly.
16. If the unit still sticks, return to Step 2. If this is your second time through the process and you're still not satisfied—*THROW IT AWAY* and go shopping for a new one.

73, Jim Idelson, K1IR

An additional note on the subject was posted by Jim Fitzgerald, KM1P:

"Applied Industrial Technologies (www.appliedindustrial.com) sells replacement bearing balls pretty cheap. I think I bought 250 for about $10. I learned this after attempting a repair of a Tailtwister rotor. Those little balls LOVE to roll all over the place and I always seem to be at least one short. While you are at it, buy a tube of Dow Corning #33 extreme low temperature grease. It's rated to -100 F—great for rotors."

(*Our thanks to Randy Thompson K5ZD for pulling this information off the YCCC reflector and passing it on to* NCJ) ■

Shortwave Listening—Multi-Multi Style CQWW SSB 1998 with the London SWL Team, RS178500

Bob Treacher, BRS32525
brs32525@compuserve.com

How many NCJ *readers know there is a highly successful SWL team in England that was assembled for the SSB leg of the last two CQ Worldwide contests?*

Clare Treacher, RS102891, (yes, my daughter) at the 20-meter station during the CQWW SWL Challenge.

Mick Toms, BRS31976, listening on 15 meters using an FT-847 transceiver.

Me listening on 20 meters using the NRD-545 receiver.

The Multi-Multi category of the CQWW SWL Challenge, which I organize each year, was started in 1996. In its inaugural year, the French team of F-11556 and F-16156 took 1st place with a score of 720k. There were 7 M/M entries that year and my team of three SWLs placed 3rd, about 43k behind the winners. For 1997, I decided to expand the team. We won with a new world record score of 1.02M. This article is about our 1998 attempt to retain 1st place and set another world record.

Since 1991, I have organized the annual SWL Challenge, which takes place at the same time as one of the major contests of the year—CQ Worldwide. The Challenge has given shortwave listeners around the world the opportunity to take part competitively in the CQ Worldwide contest. In the early years of the Challenge entries were low, but in the last few years participation has increased significantly to make the Challenge arguably the number one SWL event of the year, with entries now received from 33 DXCC countries on all six continents.

Listeners often say that most SWL contest rules are too complicated—requiring both call signs and contest exchanges to be logged. The CQWW SWL Challenge simply requires the station heard and the time of the logging to be provided. The points system is simple, too—one point for each country heard from your own continent and five points for each station logged from outside your own continent on each band. There are now single operator, multi-operator/single-receiver and multi-operator/multi-receiver sections; and there is a CW Challenge that takes place at the same time as the CW section of CQ Worldwide. At the present time, there are about 100 shortwave listeners around the world who enjoy pitting their listening skills against others—just like the licensed amateurs who enjoy the CQ Worldwide weekends so much.

1997's score of 1.02 million was the result of the team hearing 569 country multipliers. The team was comprised of Mick, BRS31976; Clare, RS102891; Paul, G3SXE (ex-ZB2CV, VP5PLX and 6Y5PL); Bob, G8JNZ; Simon, G-SWL and myself. With the expected better band conditions, in 1998, the team was strengthened with the addition of John, G3XWK (ex-C56/G3XWK and chief operator at the M8W contest station). The only other change was that Simon had an SWL callsign—RS177448.

Preparation

The team held a planning meeting six weeks before the contest where decisions were made about personnel, receivers and antennas to be used, and sleeping/cooking arrangements. Everything was agreed to be much the same as in 1997, but it was decided that an additional listener and extra antennas and receivers would be required. This would enable the team to take full advantage of the better band conditions. When a band was open, the RS178500 team would have the capabilities to monitor it.

John, G3XWK, was invited to join the team. Plans were made to obtain two extra HF verticals and extra receivers. The list of promised equipment was most impressive—two Kenwood R5000 receivers, two ICOM IC-R70 receivers, a Yaesu FT-847 transceiver (with DSP), JRC NRD545 (with DSP) and NRD525 receivers; 18AVQ, TV3 and R6000 verticals; a DSP599ZX filter, two FL3 filters, and various other accessories.

Antenna work at the BRS32525 QTH started in earnest four weeks before the contest weekend. Three of the five wire antennas already on site (sloping dipoles for 40, 80 and 160 meters) were in need of repair. Simon and I reserved one Saturday to carry out the work. Three feeders were changed and the angle of attack changed on one of the 40-meter slopers so it fired into the Far East—normally a great source of multipliers at around sunset. A new Cushcraft R6000 vertical was purchased and assembled. In the shack, much work was required so that it could support five 24-hour-a-day contest stations. A computerized "score-check" (using *Freelance Graphics* software) was designed so that the team could monitor their progress graphically at three-hour intervals. The initial target was to beat the 1997 world record M/M score, but a more difficult target was also set—670 "band country" multipliers and a total score of 1.5 million points. The team considered this second target to only be achievable if band conditions were at their very best.

Disaster Strikes!

A few days before the contest weekend, a minor disaster struck. A big solar disturbance caused the Solar Flux Index (*SFI*) to fall from 130+ to 118. The A-Index rose, and predictions of SFI: 115, A-Index: 15 and K-Index: 3 were an unwelcome sight on one of the Internet propagation pages. I am sure that everyone was hoping for a propagation forecast something like 130, 3 and 1! The team almost immediately agreed that if the bands took time to recover from the disturbance, the higher target we had set for ourselves would be very difficult to achieve.

The day before the contest, Paul, Mick and I took a day's holiday from our jobs to erect the three verticals and set up the five stations. Bob joined the team after work, while Clare and Simon joined after a day at school; John would join the team early Saturday morning. By 1700Z, the RS178500 Multi-Multi contest station set up was complete. An operating rotation was not considered necessary—in 1997 we made little use of the one we had prepared! At 1730Z, the team left for a meal in a local restaurant content that

everything was ready and hoping that band conditions would be favorable.

On Your Marks...

Twenty minutes before the start of the contest Paul, Mick and I started tuning the bands to get a feel for the conditions and to see how much DX was to be heard. Getting off to a good start in any contest is a huge bonus. We used our tried and trusted formula of 1997—Mick concentrated on 40 meters, Paul took 20 meters, and I switched between 80 and 160 meters. This use of personnel proved a winner. In the first hour of the contest we heard 109 multipliers—13 on 20 meters, 38 on 40 meters, 29 on 80 meters and 29 on 160 meters. By 0600Z, our multiplier total had risen to 218—60 on 20 meters, 63 on 40 meters, 53 on 80 meters and 42 on 160 meters. Highlights of the first six hours were—20 meters: EM1LV (Antarctica), PT0F (Fernando da Noronha), VP2V/K7AR, ZD8Z, VP8CEH and 9J2FR; 40 meters: C56T, K3LP/J6, JY9QJ, PT0F and SU2MT; 80 meters: C56T, J3A, V26B and 9Y4NW; and 160 meters: EA9EA and RZ9AZA. 15 meters did not open until 0720Z when CX7BY was heard. Our 10-meter log was started with none other than M8T (arguably the most successful contest team in the UK). At 1200Z, our multiplier total was 347. By then we had added some reasonable DX—10 meters: FG5BG, FS/K7ZUM, PT0F, TZ6DX, ZD8Z, 5X1T, 6V1C and 9G1BJ; 15 meters: C56T, PT0F, V26B and 5N0/OK1AUT; 20 meters: T88X and V63KU. By this time, John, G3XWK, had arrived at the contest QTH and quickly settled into the job of collecting new multipliers on the high bands. Twelve hours into the Challenge our multiplier total was better than in 1997 and our score had moved on to a healthy 368k.

Braving the Elements!

The weather at the BRS32525 QTH in southeast England was bad, with heavy rain and winds up to 85 miles per hour. The wind was so strong that it blew the TV3 vertical to an angle of 45 degrees. Paul and Simon braved the heavy rain and the strong winds to erect it again—returning to the house in need of a towel and a hot cup of coffee. This is as good a point as any to congratulate Clare, RS102891, for not only her logging ability but for providing a well-cooked and varied menu during the entire 48 hours. Simon, who also helped keep the computer score-check going for the two days so that our progress could be monitored, ably assisted her.

During late Saturday afternoon, Bob, G8JNZ, arrived for his logging stint after a hard day at his office. He and John soon built up a fine understanding and largely tamed 15 meters between them. That band stayed open quite late and their last logging—HK6KKK—was at 2128Z. While Bob and John were monitoring 15 meters, 10 meters produced some good DX—E30HA, FH5CB, TE45C (Costa Rica), TL8MS, 4U1UN and 5H3US. Our last 10-meter logging on Day 1 was at the early time of 1643Z—but a creditable 90 countries had been logged during the first day. 20 meters was, as usual, full of strong European signals but listening carefully between those signals Clare, Paul and I logged some fine DX—A61AC, BW0R (Taiwan), E22AAA, FR/DL5JMN, KH7R, XX9X, V8A, VU2WAP, YE5B and 9V1YC. As sunset approached, Mick took up the reins on the 40-meter station and logged A45ZN, BW0R, JA5BJC, UN7LG and XX9X for some worthwhile 5-point multipliers.

The second night was rather tough going with conditions on the low bands quite poor. Some fatigue set in with the slowdown in activity. Mick grabbed the only two hours sleep he took during the 48 hours. Bob, G8JNZ, after that day at work and an evening of DXing, had to take a nap at 0300Z. After 4 hours sleep, I awoke at 0330Z to the job of wringing out the almost non-existent DX on the low bands! Although 20 meters remained open throughout the night, no new multipliers could be found apart from 4Z1GY at 0519Z. 40 meters provided little in the way of new countries, but small pockets of DX activity gave us VP2V/K7AR, ZS6EZ, 9K2HN, TE45C, VP5T, NP2D and VP2E. 160 meters gave us GD3UMW, CU2V, 9H3WD and CN8WW, but no Stateside or Caribbean DX was heard prior to sunrise. A visit to the "DX Summit" on the Internet told us why LF conditions had been so poor—a K-Index of 3.

By 0700Z, the whole team was back at the receivers (and Clare had provided some much-needed coffee and a cooked breakfast!). Day 2 saw 10 meters open by 0800Z and some interesting DX was heard during the day—A61AC, FR5DX, HC8A, TU2XZ, V51ER, VU2JNA, Z21CS, 3E1DX, 5A1A and 7Q7DC. The 10-meter log was closed at 1632Z with CQ9K and a multiplier total of 119. 15 meters was good to us on Day 2 and we added a further 33 multipliers including B1A, FR5DX, TL5A, TZ6JA, VR2HK, ZD7VC, 5X1Z and 9G1YR. VP2E was our last 15-meter multiplier—at 1635Z—and we closed with a multiplier total of 112. Since we already had 117 20-meter multipliers in the log going into Day 2, further progress was going to be difficult. But new multipliers were found and some were quite spectacular—AH2R, B4R, DX1DBT, EP3PTT, FK8FI, KH0I, KL7AC, 3W6US, 8Q7IO and 9M6AAC. The 20-meter multiplier total rose to 135.

Again, we insured that 40 meters was monitored around sunset. We were not disappointed. Mick and I took turns looking for the DX: and some good DX was logged—AP2N, B4R, HZ1AB, V8A, 8Q7IO, 9M2TO and 9M6AAC. By the end of the Challenge, the 40-meter multiplier total had risen to 111. As usual 80 meters was full of strong European signals and locating the DX was not easy. However, our multiplier total reached 89. On 160 meters, a K-Index of 0 near the end of the contest meant that some catching up was possible. We found seven new multipliers in the last three hours—GJ, EA8, OH0, T7, 3V8, CT3 and 4X4—and we finished with a very creditable 59 multipliers.

1999

This year will hopefully see an SSB CQWW SWL Challenge with superb conditions. Our multi-multi score would definitely have been even better had it not been for the solar disturbance a few days before the contest weekend. We did not reach the higher target of 1.5 million, but in view of the conditions we experienced, we came very close to doing so. However, we won the multi-multi category, setting a new world record of 1.24 million points, which beat the old record by 230k. We also had 625 multipliers.

The London SWL team enjoyed a fantastic, if tiring, weekend and set a more difficult mark for others to try and beat in 1999. With better band conditions, it is highly likely to be beaten.

Now is the time to consider whether YOU can put together a team of listeners capable of setting a new world best. If there is another Multi-Multi SWL team out there, we would gladly accept your challenge!

Indeed, I am already aware of one French team headed by Tim, F-16954, who in an article posted on the Internet SWL Reflector, said he would try to assemble "...the biggest M/M team of all time so that we can beat these British that always win..."

I cannot help thinking this would be a fun thing to do during those phone weekends I really don't like to operate. It might be big fun to get some of the newbies or wanna-be newbies over to the shack and put it to use! This touch of competition might be just the thing to introduce a young person or interested SWL to contesting... and you can be on the team too!—BV ■

Contesting from the British Virgin Islands

Mark W. Perrin, N7MQ/VP2V
55 Coachman Dr
Eugene, OR 97405
mperrin@ordata.com

The Cinco Nueve Contest Group is a loose knit group of DXers and contesters from Portland and Eugene, Oregon and Vancouver, Washington. The group usually travels abroad each year to participate in the CQ WW DX contests. In addition, our members occasionally make solo DXpeditions for contests or to be DX.

The Eugene members of our group had traveled to ZF8, ZF9 and XE3 individually and had great fun with the pileups. In 1997, we decided to go to the Cayman Islands and operate M/S. We invited Al, K7AR, who has operating experience all over the world, to go with us.

Our travel in 1997 to Little Cayman Island was outlined in "The ZF2RV Story" in the March/April 1998 *NCJ*. Our operation was Field Day style. The difference in our results and those of our friendly competitors at ZF1A (November/December 1998 *NCJ*), who waxed us, showed we needed to improve the antennas in our arsenal.

Where Do We Go Next?

As we flew back from Little Cayman Island, we talked about where to go next. The group gathered in early 1998 at the home of Al, K7AR. We decided that the relative lack of recent contesting from VP2V merited a hard look at travel there for our next contest DXpedition. Al had operated from Tortola in 1993. He produced a brochure he had describing the villa where he stayed. That was enough—we immediately called the owners and made reservations for the 1998 CQ WW SSB contest.

Some of those who went to ZF8 were unable to go to VP2V. Fortunately, we were able to have Bob, W7YAQ, and Jim, K9JF/7, agree to join us. Our group would be Al, K7AR; Lee, N7NU; Jim, K9JF/7; Bob, W7YAQ; Ron, WJ7R; and Mark, N7MQ.

As the spring turned to summer, we finalized the team. Our practice is to rotate using the calls of our group, on a seniority basis. That meant we would operate the contest using Al's call—K7AR. Unfortunately, VP2V does not currently issue temporary contest calls or individual calls to non-residents. We would have to use the dreaded "stroker" call, which ultimately led to some confusion during the contest requiring us to provide numerous fills and slowed things down some.

Equipment and Antennas

On earlier trips, we were satisfied with the performance of our rigs and amps. We decided we would continue to use three Kenwood TS 570Ds, one ICOM IC-736, and two Ameritron 811H amps. In addition, Bob, W7YAQ, agreed to bring his Yaesu FT-900.

As mentioned earlier, we felt we needed to make significant improvements in our antenna selections. It was clear from our ZF experience and those of the 6Y4A (later 6Y2A) gang that vertical arrays near the seashore would play great and take care of most of our needs.

Still, we wanted to add a triband beam to improve our high band QSO totals. After considering size, weight and transport ease, we chose the Force 12 C3SS Yagi.

We also wanted to improve our performance on 160. Jim, K9JF, looked at Gladiator's top loaded vertical. 9M0C, VK0IR and other DXpeditions had used this well-known antenna and we decided to add our operation to the list of happy customers.

Equipment and Travel Issues

We packed all the antennas in rigid golf bag carriers and presented them to the airline as checked luggage. We packed the amps in the large Pelican 1650 cases and checked them as well. We individually carried our transceivers and computers as part of our in-cabin luggage.

We went through some uncomfortable moments when we learned that the final leg of the trip (San Juan, Puerto Rico to the BVI airport on Beef Island) would involve use of a small inter-island aircraft. Carry-on and overall luggage weight limitations had greatly complicated our efforts to get our gear from Grand Cayman over to Little Cayman in 1997. Our concerns turned out to be unfounded since the island jump was made on an *American Eagle Super ATR* with plenty of space for large cargo (including sailboards) and our amp and antenna cases.

Our VP2V Villa

Unlike our trip to the Caymans, we experienced no problems with the rental property on this trip. We rented both floors of a two-story villa with four

A visit with Bob, VP2VI/W0DX, at his place. L-r: W7YAQ, K7AR, VP2VI, K9JF and N7MQ.

Looking down on Road Town, the capital city.

bedrooms and lots of balconies with railings. The *Lloyd Hill Villas*, owned by Mr. and Mrs. Hugo Vanterpool, are located on a steep hillside about 1,200 feet above a cove looking out over the Atlantic with uninterrupted eastern shots to the Canaries, Azores—and behind them, of course—Europe and Africa.

We had used slides Al had taken during his 1993 trip to this location to make a sketch of the grounds. We used this drawing to plan antenna locations and estimate coax needs.

Propagation and Band Planning

Our band operation strategy was another major planning issue for us. When we operated XF2RV, we had several members who were Cayman veterans with a good feel for propagation and the unique band openings. We did not have that experience for VP2V.

While one may think of ZF and VP2V as both being Caribbean locations and thus having similar propagation, that is not the case. VP2V is about 1,200 miles east of ZF, which means different propagation patterns. For example, no DX population center has a beam heading from VP2V that goes through the eastern United States. All headings from ZF to Europe do.

So, while VP2V seemed to promise better propagation to Europe and Africa with less competition from East Coast US stations, we had no experience to confirm our suspicions. What to do? We started by e-mailing requests for information to fellow contesters who had previously operated in the Eastern Caribbean.

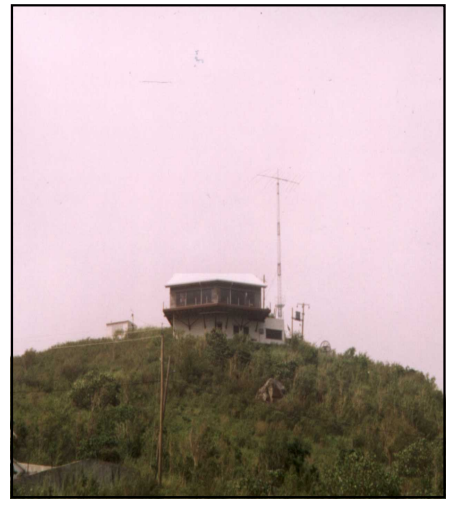
This effort fortunately produced the *.bin* file from the V26B gang for their 1997 CQ WW SSB operation (many thanks to Sam, WT3Q, for sharing their log with us.) Their operation was M/M. We found it easy to extrapolate their data and set goals for our M/S effort. *MiniProp Plus* and *DX Aid* software programs were very useful tools for this exercise. We created a pre-trip manual that included band plans for the contest. We further fine-tuned the band plan once we arrived and had a chance to check out our computer predictions.

Travel to Tortola

September found us meeting for a final trip planning session and pre-packing of a lot of the gear. We had decided that two of our gang, Ron, WJ7R, and Mark, N7MQ, would go down three days ahead of the main force of operators to verify the pre-trip assumptions about antennas and their locations, set up some of the antennas, and to see if there were any unanticipated problems.

They finally arrived at the villa, where they were met by our hosts, Mr. and Mrs. Vanterpool, after a flight delay and an unplanned overnight stay along the way.

The R5—our constant companion and a great performer, especially this close to the ocean.



The QTH of Dirk, VP2VF.

Initial Setup

It turned out that Mr. Vanterpool had not been on Tortola when Al operated there in 1993, though Mrs. Vanterpool had enjoyed that group's visit. Mr. Vanterpool watched quietly as the days went by with more and more antennas erected, coax draped throughout the villa, and furniture moved about to suit the operating needs. He became a regular guest and seemed to enjoy our *"playing radio,"* although our passion seemed strange to him!

During our trip we enjoyed many conversations with this friendly couple and left feeling we had known our hosts all our lives. Our group always considers getting to meet the local citizens an added bonus to the radio fun.

After checking in and enjoying a snack provided by the Vanterpools, Ron and Mark set up two stations and three antennas—a Cushcraft R-5, a Butternut HF-6V and a Fritzel FD-4 dipole. They were on the air two hours after arriving, working the pileups and checking out the pre-trip band plans. In general, the tips from the V26B data and the *MiniProp Plus* predictions proved correct.

The next task for these guys was locating a mast for our C3SS Yagi. They went into Road Town. It turned out that the island's one plumbing supply store had state of the art computers, a well-stocked warehouse and great service. They purchased a 21-foot length of galvanized pipe and made arrangements for delivery.

While waiting for the rest of the group, Ron was constantly on 30, 40 and 80 CW. Mark appeared mostly on the WARC bands operating SSB. The remaining Cinco Nueve Contest Group members arrived as planned somewhat fatigued but eager to join the fun.

Roommates were chosen, badly needed showers enjoyed, and pileup stories enthusiastically shared with the new arrivals. It wasn't long before they too jumped into the operating chairs to share in the fun. Each operator grabbed whatever sleep his adrenaline pumping body would allow.

The next morning, we moved the furniture into the final arrangements for the contest and erected the rest of the antennas. It did not take long before we were all enjoying pileups. We were surprised how many of our contacts resulted in a new band-country or all time new one for the callers. One of the special pleasures of DX travel is providing a new one for the Deserving.

Final Pre-Contest Planning

We always appoint an Operating Czar, whose callsign will be used in the contest. Al, K7AR, had the honors for this trip. Al gathered the group to finalize pre-contest planning. We put our three stations in the L-shaped dining room/kitchen area on the first floor. Next, we made our final arrangements for antenna switching, installed band pass filters, and set up the computer system.

We use *CT* for the contest logging on a variety of laptops. Our network approach is to have one computer with two serial ports at the run station and

then attach two other computers off of it. That way we had a normal mult station as well as a third station. This station is available as a backup with an online computer in place. Since we did not have packet spotting, the third station was also used by off duty operators to look for mults and to check for openings.

We had checked the computer system several times before we traveled and it did not fail us on the island. It cannot be overemphasized that networking in an office environment is one thing, while networking on a DX trip is quite another. Lots of planning and testing will pay off.

The best test of the station setup, of course, was on the air operating. Since our contesting would be done on SSB, we primarily operated on CW right up to the start of the contest. The operators took turns at the controls of the rigs. Everyone tried to build up a "sleeping reserve" when not operating or sightseeing.

Calming the Pre-Contest Jitters—The Virgin Islands and Sightseeing

VP2V is a beautiful place. It looks something like a small version of Hawaii. There are flat areas along the lee shores but these quickly slope up to narrow ridge tops with plenty of plants, trees and greenery. There are palm trees here and there; older homes with very bright paint; newer concrete homes with red tiled roofs; and beautiful views everywhere.

We were on the backside of hurricane *Mitch* experiencing increased levels or rainfall each day of our stay. This proved to be of some inconvenience but certainly nothing like the weather that hit Honduras, Belize and Guatemala.

Some of us went to a local Rotary International Club luncheon and met many locals. When they learned why we were on the island, several mentioned they too were hams, although inactive. All said, "You have to meet Bob." They were, of course, referring to the Bob Denniston, VP2VI—W0DX, who started all of his well-known DX travel just after WWII. Well, Bob did show up for the luncheon, and we had a great visit. He also invited us to come visit him the next day, which we promised to do.

That night, we had the worst rain of the entire trip. When we got into the car the next morning to go visit Bob, we encountered a VW-sized rock in the middle of our road! Further down the road, we had to deal with downed power lines as well as rock and mudslides. The skies grew darker and darker as we got closer and closer to the cut off to Bob's home, What were we getting into?

Then, just as we were ready to turn back, we met Bob on the road. We followed him to his place. We parked in a small lot with lots of downed palm fronds and puddles of water only to walk out into the sunshine and look out on Smuggler's Cove. The view was exactly what everyone visualizes as the perfect sandy beach. People started coming out from under trees and behind cars heading back to their swimming and snorkeling. We helped Bob take soft drinks and beer to his bar and enjoyed a round of drinks. That led to lots of talk centered on his ham experiences and about his life in the British Virgin Islands. What a great gentleman.

We discovered that most VP2V contacts in recent years have been made by Dirk, VP2VF. We tried to get together with Dirk but the deteriorating weather and contest schedule kept us apart.

As the days went by before the contest, we kept all antennas in full use. We concentrated on the WARC bands, CW and RTTY. We fell into a rhythm of getting up, fixing breakfast, getting on the radios, operating until hungry, getting our own lunch from sandwich fixings, operating during the afternoon and then stopping for dinner. The local grocery store was a good one and supplies cost just slightly more than in the States. It was interesting to find out that US money was the standard currency of the British Virgin Islands.

On several occasions we went into Road Town to enjoy a meal at *Pusser's Outpost*. *Pusser's* was once the supplier for rum to the British Navy. They still distill and sell their rum and now have a number of restaurants throughout the islands. Their food was great and so was the local draft beer. Out of scientific interest, we sampled several tots of rum. The "studies" were continued back at the villa after an adequate supply was laid in.

The Contest

Then it was time to contest, with the start being at 8 PM local time. As the magic moment drew near, a serious thunderstorm was headed right for us. Heavy rain fell and lightning was all around us. We sat in the middle of the ground floor of our rental with all antennas and rigs disconnected. Thankfully, the storm abated about 30 minutes after the start of the contest. We jumped into the commotion full force to make up for lost time.

In pre-contest operations, the C3SS beam had played great well into the early evening hours. Obviously, we wanted to maximize three-point Qs, so we decided to open the contest with the run station on 20 and the mult station on 40. Al had the honors and started on the run station for VP2V/K7AR. Mark started on the mult station and we were off and running!

We quickly fell into a "four hours on/eight hours off" shift routine, alternating on the run and mult station.

Off-duty ops would check the computer for needed mults and pass info to the on-duty ops. The run station maintained a 215 rate on 20 meters for the first five hours. The mult station picked a few off early on 15 meters and then settled in on 40 meters for the remainder of the first three hours. The mult station then slid down to 80. We hit 160 at the top of the hour. And so it went as we traded shifts until the contest was over.

We made 5,700 QSOs and a claimed score of 8.5 M points. Behind the raw score one finds these details: We averaged 2.41 points per QSO, which was a big improvement over our prior year from ZF. 80% of our contacts were made on the higher bands—1,818 Qs on 20; 1,723 on 10; and 1,537 on 15 meters. The openings on 160 were poor during the contest. 40 was not as productive as the previous year.

Some great DX stations showed up on Sunday in the final few hours and gave us a thrill at the mult station: 4U1VIC, 6V1C, A45ZN, HB0/HB9AON, LX2LX, SU2MT, 4U1UN, D2BB, Z21CS, FH5CB, FR5DX, 8Q7IO, 4S7BRG, B1A, IH9P and many others. In addition, we finished the day working V26B on all bands.

Post-Contest Fun

We piled in the car and went into town to *Pusser's* to celebrate with a nice meal and drinks. As has been the case on each of our previous trips, we found we had improved our score. Naturally, we were already talking about where we would go in 1999.

Whatever the future holds for us, we will have this experience forever as a grand memory. We enjoyed getting to know the local people in all walks of life. We got a good feel for the way the islanders live, work and play. We visited a garden-like world of water, plants and sky. And we had *great* propagation—allowing us to live the many thrills one can enjoy in our special interest within the hobby.

All of this underscores what is great about ham radio and DX travel. We will again travel somewhere warm and sunny this fall and our group hopes to work you all.

In the mean time, check out the Cinco Nueve Contest Group Web page at **http://www.qsl.net/k7ar**. ■

ARRL Log Checking—A Look at the Process for the November Sweepstakes

Contributing authors: Larry "Tree" Tyree, N6TR; Trey Garlough, N5KO; Ken Widelitz, K6LA; and ARRL Contest Branch Manager Dan Henderson, N1ND

The 1998 November Sweepstakes brought ARRL-sponsored contesting to the next level. Thanks to some detailed planning and hard work, electronic logs would now be scrutinized thoroughly to ensure their accuracy. Real log checking has arrived at the ARRL Contest Branch.

During mid 1998, ARRL Membership Services Manager Bill Kennamer, K5FUV, began working with several computer software experts on developing software which would allow logs submitted to the League to be electronically checked. Dick Norton, N6AA, used his expertise to put together checking software for the IARU HF World Championships. Dave Pruett, K8CC, and Tim Mitchell, K9TM, headed up work on logs for the 1998 ARRL 10-Meter Contest.

Larry "Tree" Tyree, N6TR, and Trey Garlough, N5KO, came together and accepted the challenge of developing the software which would check the ARRL's "horserace" event: the November Sweepstakes. Over the period of several months, these two nationally recognized contesters spent hundreds of hours writing and revising the programs which would be used to verify and confirm hundreds of thousands of QSOs in what is traditionally the ARRL's most popular domestic contest.

There have been some pretty good questions asked of the League and the software team. We hope to answer a few of the more common ones in this article.

Why are we checking logs? In any contest there are guidelines to be followed. The purpose of enhanced log checking is to level the playing field for all competitors. We all make mistakes in our logging. Log checking is being used to help locate any possible errors so that the recorded score is as accurate as possible.

Why did I have contacts removed? Are you accusing me of cheating? The contacts are removed because they contained at least one part of the required exchange—callsign, QSO number, power level, check and section—which was recorded in your log inaccurately. While someone who added QSOs which they did not make can also be detected in the process, the real purpose is to provide accurate scores.

Are paper logs checked to the same degree as electronic logs? No. Paper logs are not checked. However, if they are competitive, possibly included in the Top Ten or a Division winner, they will be typed in by hand at the Contest Branch. Any errors introduced during this transcription process will be included in the results.

So since paper logs are not checked, I am better off just submitting the paper copy of my log,

Putting the Log Checkers to the Test—Final Score: Log Checkers 31, K6LA 2

During the development of the Sweepstakes log checking software, N6TR and N5KO received valuable help from Ken Widelitz, K6LA. Ken, one of the top contesters in the US today, tapes his contest sessions. In reviewing his CW Sweepstakes error report for 1997, and comparing it against his tapes, he was dismayed. Of the thirty-one errors flagged, a review of the tapes showed twelve could be verified by his tapes. Discussions with Bill Kennamer, K5FUV, Membership Services Manager at the ARRL, led to the discovery that most of these errors came about because other participants had either incorrectly filled out their summary sheets, or that data entry errors had occurred. K5FUV and new ARRL Contest Branch Manager Dan Henderson, N1ND, began working on ways to ensure better quality control at the League. By the time of Dan's arrival, Bill had already brought N6TR and N5KO into the project to develop the log checking software.

Having access to K6LA's tapes gave the design team a great tool for testing the Sweepstakes log checking software during the development process. After working up the software package, Ken's log was run through the program. This allowed the developers a chance to have some sort of idea if the software was doing what was intended. They then compared the output with the taped record. Several busted QSOs were found to be stations which changed their exchange sent during the contest—what the log checkers call "unstable logs." Once these were addressed by Tree, the final score was Log Checkers: 31; K6LA: 2. One of those two QSOs should have been marked as correct; the other was a QSO that should have been busted by the program but wasn't.

The QSO in which Ken's tape verified his contact proved an interesting lesson. He worked a station and got the correct serial number but busted the number in the call. He later reworked the station, this time entering the correct call sign and a new serial number. Ken lost credit for the QSO because the station didn't log the second QSO: it showed as a dupe, even though a serial number was given. In Ken's words, "*This* is the reason to log dupes."

Ken also noted that many of the errors were made using the second radio in his SO2R setup. In six of the lost QSOs, he asked for a fill on the busted information. In three cases, he sent back what he thought he heard and the other station confirmed the bad info. In two cases, he busted what was resent. In the sixth case, he asked for a fill on a call, but didn't get it, but logged it anyway (big mistake!).

In the case of the only NIL, which was made on the second radio, Ken asked for a fill, but for some reason never got it. The other station did the right thing: he didn't log the QSO. Two more errors were a matter of QLFing by the other op. Ken recognizes he should have asked for a fill but just didn't. In four more cases he asked for a fill on the QSO, but still busted another piece of information in the exchange. Ken also notes that nine of the errors were made on the second radio: which is a disproportionate number of errors based on the number of QSOs made on that radio.

What is Ken's advice from this experience? First, make certain the other station sends fill info if you ask for it. Don't send it back to him and ask for a confirmation. Second, don't spin the VFO dial quite so fast on second-radio QSOs. Listen more carefully on the second radio to the station's *next* QSO. Finally, log all dupes.

right? Wrong. If you submit a computer generated log, the rules are being changed to require that you also submit the data file, in ARRL File format. This will include not only those that use one of the major logging programs such as *TR*, *NA* or *CT*, but also those who use word processors, such as *Microsoft Word*, and spreadsheets, such as *Excel*. Failure to submit the data file for electronically generated logs will result in those logs being made check logs, ineligible for competition

What if I don't use a computer to log? If you still log by hand, your log is still eligible for inclusion as a line score in the results. But in this day and age, where over 80% of all hams have access to computers, creating the required ASCII text file is quite easy. With a word processor you can enter the information into an acceptable file format (see the General Rules for All ARRL Contests for the format). You can also do the same with a text editor in *DOS*. You don't have to purchase one of the logging programs to create the appropriate files.

What is a good error rate? On CW, the error rates are all over the place. For middle of the pack scores they ranged from 1.0 to 2.2 percent to as high as 35.1 percent. On SSB, the results are more consistent—we don't see the error rates climb quite as high. This would suggest that CW ability might have something to do with the higher error rates on that mode. Also remember that error rates do not include penalties.

For either mode—the following guidelines might be helpful.

0–1 % You have achieved the pinnacle of accuracy success.

1– 3 % A world class performance.

3–6 % A world class performer having a bad day.

6–9 % You have the ability to achieve world class performance but need to improve your focus on accuracy. Look for specific periods of time during the contest period in which the errors occur.

10–25% If accuracy is important to you—you might think about changing your operating style. Slow down a little—make sure information is correct before you enter it in the log. Don't be afraid to ask for repeats.

> 25% First the bad news: your error rate is probably higher than reported since multiple errors for the same QSO are not counted as two errors. Also, the program has a harder time busting your unique QSOs. Probably ALL of the unique QSOs left in your log could be busted.

I asked N6TR for a copy of my error report and was told he didn't have an electronic log from me. What happened? I know I sent in my log and got a confirmation over the Internet. The process for submitting logs has been greatly improved and there is less of a chance of your log being lost this year than before. The process is still not perfect, however, and work continues to improve it. Your best bet is to check the list of Logs Received which is posted on the ARRL Contest Home Page after the logs are initially processed (**http://www.arrl.org/contests**) and verify that your log is there. If it doesn't appear on that list you should contact N1ND at the League as soon as possible. If you submitted your log over the Internet and it was received, there will be a backup copy of the log on the server. If you submitted it on a diskette via the US Mail, it may not have arrived (remember that November Sweepstakes logs are moving through the post office during the annual Thanksgiving/Christmas holiday rush).

Not every electronic log makes it into the process. Trey, N5KO, invented a process to convert the electronic logs into a consistent format that N6TR's log checking program can handle. However, many submit logs that do not conform to the required ARRL file format and can not be included. We do our best to use any format received, but some formats can not be converted with the tools available to us. We do not have the resources to go through and manually change those logs that are not in a format at least similar to the required format. We also receive logs that have incomplete information, such as missing checks or sections for example. These logs can not be used in the process. These are treated like paper logs and unchecked scores when published in *QST*. Trey is currently working with the authors of most of the major logging programs to standardize output files and summary sheets to meet ARRL file format. When in place, these revisions will further enhance our ability to process electronic logs accurately and expediently.

I sent in a letter (or e-mail or note attached to the log) to the Contest Branch when I discovered an error in my log and asked that it be changed. I lost the QSO anyway. What gives? Unfortunately, we do not have the manpower or resources to correct your log, even if you submit a request. With over 3,000 logs received for Sweepstakes alone the staff at the League does not have the time to make changes. It is the responsibility of the entrant to submit the log they wish to have checked. If you submit a complete corrected log within the 30-day time frame for submission, we can accept that log for inclusion. If it is after that 30 days, we must use the originally submitted log.

The Contest Branch received many notes and e-mails with messages like "*I can't get the logging software to make this change for me; please fix it in my log.*" If you are having a problem with the software, you should consult the software developer for your logging program. The log file you submit is the one that will be checked, so take some time to edit your file and check for possible errors before you send that e-mail or diskette.

A QSO was removed from my log that I know was correct. How did this happen? What should I do? We have found one or two cases where the log checking software did make an incorrect decision about a QSO. If you suspect this happened, you should contact N6TR and/or N1ND and ask. This information will be useful to help us understand how the program is working and so that we can make improvements as necessary. But please, make certain you have specific QSOs in question, not just general statements like "*I know I didn't make that many errors: I want my logs checked again.*" So far in every case where a person has questioned his score reduction, once he has seen the error report there have been very few individual QSOs in question.

In all cases, we can show you the information the program used to make its decision. Most of the time the data speaks for itself. N6TR estimates that the log checking software has an error rate around 0.2%—meaning that, on average, two QSOs were removed from a log of 1000 that should not have been taken away. Additional verification by hand of the top logs, however, has revealed an error rate of less than 0.1%. This means that in almost every log reviewed, no QSOs were taken out that should have remained. We are reasonably confident that any QSOs removed unintentionally are probably offset by others that would have been removed had more aggressive checking been employed. We can't look at all of the logs submitted with the same level of scrutiny that the top logs receive, but if you notice something unusual, please let us know.

Why did I lose all of these unique call sign QSOs in my log? You didn't. For any call sign that was judged to be unique in your log, you received credit.

OK, log checking is here. What's next? We have some ideas for improving the process for future years. Our goal is to get our error percentage as close to zero as possible. At the same time, we are looking to do a better job of matching up the busted call signs to the correct call signs. This will improve the accuracy of the end result.

What can the participants do to help? First and foremost—take your time and strive for accuracy. Many of the busted call signs are simple typographical errors: inverting two letters such as NM instead of MN or using the letter O instead of the number 0 in a call sign, for example. If you watch for simple errors such as these, you will see your error rates drop and your final score will be closer to your claimed score.

Approximately 60% of the logs received for our contests are now computer generated—yet we only receive the electronic files for about two-thirds of these entries. If you use a computer to log, you really have no reason not to submit the electronic data file. The rules are being changed to *require* submission of the data file if you log electronically. This will help to put participants on the same playing field—where *all* of their logs will be checked and scored. This will give us a more accurate determination of the real winners.

There has been some grumbling about the improved log checking at the ARRL Contest Branch. However, on the whole, the process has been seen as a breath of fresh air and new challenge to the contest community. By the end of 2000, these new processing procedures should be in place for all of the ARRL contests—from the VHF Sweepstakes to the 160-Meter Contest. This presents a challenge to all of us. It challenges the Contest Branch and log checkers to keep pace with the times. It requires the contest community to strive for greater accuracy, and it requires all of us to continue to put out our best effort as we seek to enjoy this special part of our Amateur Radio hobby.

The K4VX 10-Meter *Rhino Gun* Yagi

Lew Gordon, K4VX
k4vx@nemonet.com

In *The ARRL Antenna Compendium Volume 3*, I described an 8-element 10-meter Yagi that was dubbed the "*Elephant Gun*."[1] The antenna, mounted on a 50-foot tower, performed well from 1986 until 1997 when high winds bending nearby tree limbs destroyed both the reflector and the last director.

I was faced with two options: 1) Rebuild the antenna and remove the offending trees, or 2) Replace the antenna with a much shorter boom and leave the trees. My XYL Terry, NS0Z, "recommended" the latter! Thus I reluctantly replaced the *Elephant Gun* with a 6-element Yagi on a 36-foot boom.

While the 6-element Yagi performs as one would expect, with sunspots climbing back up to triple digits I again longed for the crushing signal one enjoys only with the longer-boom Yagis. When I removed my trusty 20-year-old 6-element 10/15-meter cubical quad (due to broken wires) in the fall of 1998, I decided to salvage the boom, extend it to 48 feet, and use it for the backbone of a new Yagi. Although I could extend it further, to 57 or 58 feet, and build a new version of the *Elephant Gun*, I wanted to see just what results I might obtain with the somewhat shorter boom. As this new "*Rhino Gun*" would be installed at 100 feet, tower torque was a major consideration.

Design

Using *YAGIMAX*[2], I began my design analysis with eight elements on a 48-foot boom. I soon discovered that practically the same results could be obtained with seven elements—in fact the bandwidth and front-to-back ratio (F/B) appeared better with seven elements. The resulting cylindrical element dimensions and element spacing is given in **Table 1**.

Table 1

Total length of each element and its position on the boom relative to the reflector as determined by *YAGIMAX*. The cylindrical element dimensions in this table are for elements 1.0 inch in diameter for their entire length. See Table 2 for tapered half-element lengths.

Element	*Length (inches)*	*Distance from the Reflector (inches)*
Reflector	211.3535	0
Driven El.	191.5740	62.0000
Director 1	190.5018	120.5000
Director 2	185.7960	199.0000
Director 3	180.1589	299.0000
Director 4	183.1697	460.0000
Director 5	180.3223	574.0000

Table 2

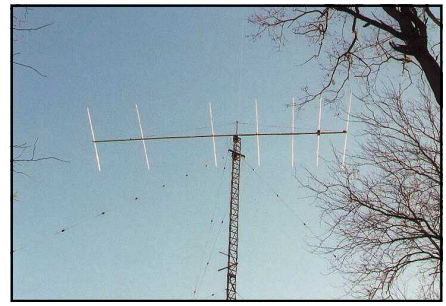
Lengths of tapered half-element sections generated by *TAPER*. Half-element sections (with the exception of the driven element) are interconnected by a 36-inch piece of 0.875-inch tube inserted inside to form the full element. Dimensions given for the element tips (0.875-in diameter) in the table are *exposed* length. Additional length will be required to provide the portion that telescopes inside the 1.00-inch diameter section during the final assembly.

Element	*Section Length (inches)*	
	1.00-inch diameter	*0.875-inch diameter*
Reflector	72	35.13
Driven El.	72	24.38
Director 1	72	24.49
Director 2	72	22.10
Director 3	72	19.21
Director 4	72	20.75
Director 5	72	19.30

Construction

The old *Elephant Gun* used small diameter tapered elements, which partially accounts for the destruction I encountered. For the *Rhino Gun* I chose 6-foot lengths of 1.0-inch diameter 0.058 inch wall center half-element pieces tapering to 0.875-inch tip end pieces.[3] Each full element has center reinforcement consisting of a 36-inch piece of 0.875-inch diameter 0.058-wall tubing. **Table 2** lists the actual half-element construction details derived using my *TAPER* program.[4]

The driven element is split and



insulated from the boom and fed with a hairpin match. The driven element dimensions were determined using 50 Ω coaxial cable with the hairpin.[5] The current "balun"[6] consists of ferrite beads over RG-213 cable at the hairpin and element connection. The hairpin was fabricated from a 30-inch aluminum rod 0.25 inches in diameter bent into a "U" shape with 5-inch spacing. The center of the rod is bonded to the boom providing dc ground. The remaining six elements are mounted to the boom by 6-inch pieces of 2 x 2-inch aluminum angle stock 0.2 inches thick. The angle stock is secured to the boom using 3 inch plated muffler clamps. The elements are secured to the angle stock by stainless steel hose clamps. Flat mounting plates could be used as well.

Anyone contemplating construction of large long boom antennas should familiarize themselves with the effects of wind loading, torque and material strength. These topics go beyond the scope of this article. Of critical importance is the construction of the boom. In my case the original 40-foot quad boom was constructed from the remains of two Yagis which were destroyed when a 120-foot tower came down during a violent windstorm in 1977.[7] Using salvaged boom sections from a 5-element 20-meter KLM "Big Stick" and a Wilson 3-element 40-meter Yagi, I was able to make a straight 40-foot boom of 3-inch tubing with approximately 0.10 inch wall, reinforced in the center with 2.75-inch tubing. This boom supported my 10/15-meter 6-element quad for 20 years with no problems; thus I had no qualms extending the boom 8 feet for the *Rhino Gun*. Anyone pondering the use of thin wall irrigation tubing, however, should definitely truss the boom at 120-

[1]Notes appear on page 19

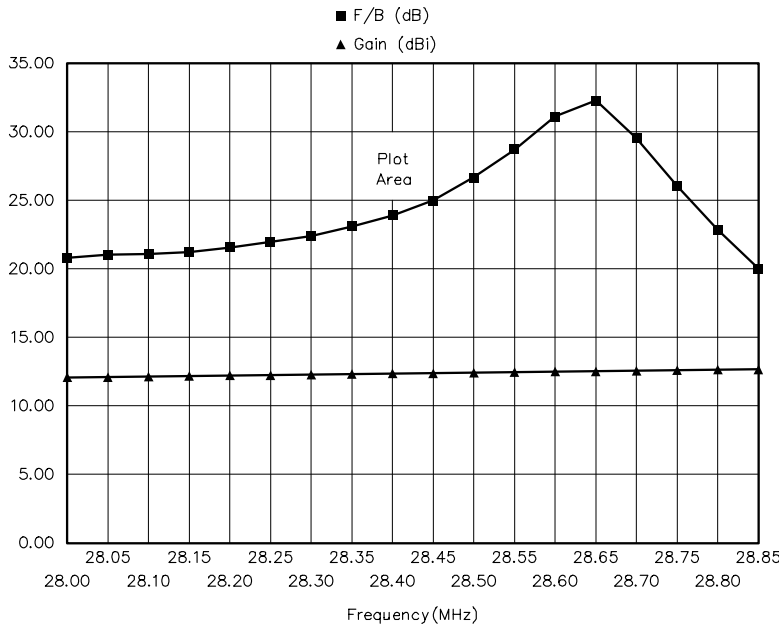


Figure 1—The theoretical forward gain and F/B of the *Rhino Gun* Yagi antenna as derived by *YAGIMAX*.

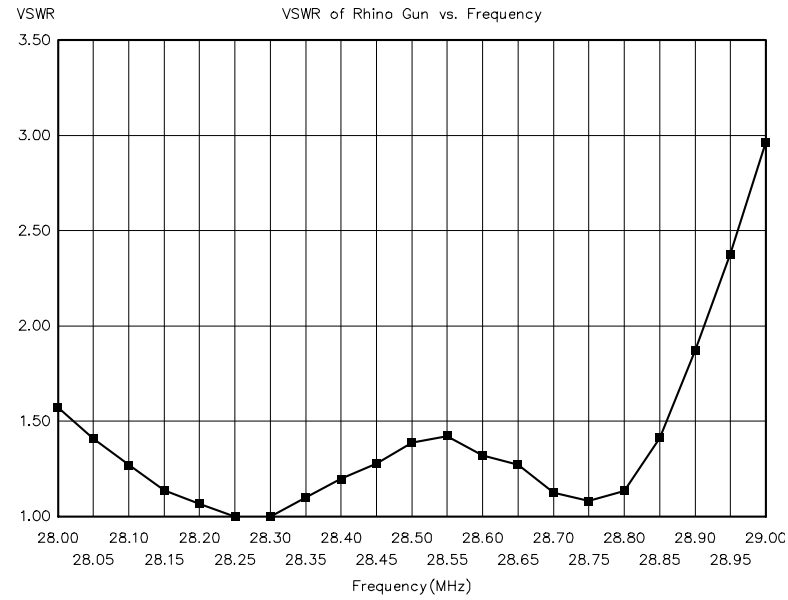


Figure 3—The VSWR vs frequency of the *Rhino Gun* Yagi as predicted by *YAGIMAX*.

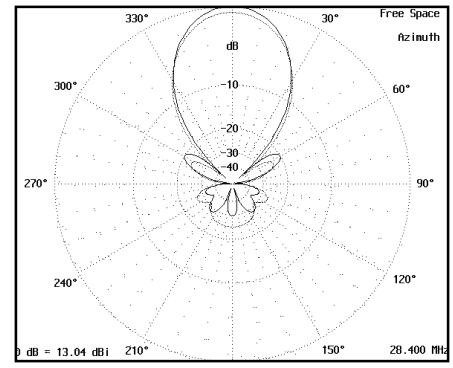


Figure 2—The free space E-plane pattern of the *Rhino Gun* overlaid with the *Elephant Gun* pattern. *The Elephant Gun* (shown by the darker line) has slightly better forward gain but its boom is 9.5 feet longer.

Table 3

The predicted performance of the *Rhino Gun* Yagi. The data is generated using the *YAGIMAX* software.

Frequency (MHz)	*Gain (dBi)*	*F/B (dB)*	*Impedance (R+/-jX)*
28.00	12.00	20.69	27.21-*j*33.50
28.05	12.05	20.77	27.01-*j*32.64
28.10	12.10	20.89	26.70-*j*31.79
28.15	12.16	21.07	26.29-*j*30.96
28.20	12.21	21.34	25.76-*j*30.12
28.25	12.27	21.70	25.09-*j*29.25
28.30	12.32	22.20	24.29-*j*28.33
28.35	12.38	22.86	23.34-*j*27.33
28.40	12.44	23.73	22.26-*j*26.22
28.45	12.49	24.89	21.06-*j*24.97
28.50	12.54	26.45	19.77-*j*23.56
28.55	12.59	28.53	18.40-*j*21.95
28.60	12.64	31.00	17.01-*j*20.14
28.65	12.68	32.05	15.62-*j*18.12
28.70	12.70	29.47	14.28-*j*15.90
28.75	12.72	25.82	13.02-*j*13.48
28.80	12.71	22.63	11.87-*j*10.89

degree intervals and reinforce the center as well.

Tuning

In order to tune the antenna at ground level, it was supported so that the boom was vertical and the reflector was approximately 3 feet off the ground. The driven element only required that I lengthen each half-element tip 0.5 inches to effect a nearly 1:1 VSWR at 28.3 MHz. The VSWR shifted only slightly with the antenna installed at 100 feet. I have used this tuning technique with good results on several antennas where it would otherwise be impossible to reach the feed point from the tower with the antenna installed in its final location.

Rotor Considerations

As with all of my antennas, I use modified propeller pitch motors and selsyn indicators. I would not recommend the use of any of the popular tribander type rotators, as the torque on the mast will eventually destroy the brake and gears.

Performance

Figure 1 shows graphically the theoretical forward gain and F/B of the antenna as derived by *YAGIMAX*. Figure 2 shows the free space E-plane pattern of the *Rhino Gun* overlaid with the *Elephant Gun* pattern. The difference in forward gain is approximately 0.6 dB at 28.0 MHz and 0.75 dB at 28.6 MHz in favor of the *Elephant Gun*, but the boom is 9.5 feet shorter. The predicted performance of the *Rhino Gun* is also profiled in Table 3. The actual measured VSWR of the antenna at 100 feet is

shown in **Figure 3**. These numbers are adjusted for the feedline loss[8] and closely represent the actual VSWR at the antenna.

The on-the-air performance of the antenna is excellent. My first QSO was with Ron, ZL1AMO. I ran some comparison checks between the 6-element Yagi at 50 feet and the *Rhino Gun* at 100 feet. Ron's estimate was that the *Rhino Gun* was almost a full S-unit (about 5-dB) better. I have received similar comments from other DX stations. Of course the added height helps.

As I said in my article on the *Elephant Gun*, "This is a serious antenna for serious contesters and DXers."

Notes

[1]*ARRL Antenna Compendium Volume 3*, p 76.

[2]*YAGIMAX* is a software modeling program for Yagis written by the author. It is available from the author as shareware.

[3]Type 6063-T832 drawn aluminum tubing for this antenna is available from Texas Towers, 1108 Summit Avenue, Suite 4, Plano, TX 75074, and can be shipped UPS.

[4]*TAPER* is part of the *YAGIMAX* software package available from the author.

[5]The hairpin match requires shortening the driven element to the point where the capacitive effect is canceled by the inductive effect from the hairpin leaving 50 Ω resistive impedance. Other matching methods may require longer driven element dimensions.

[6]Six Amidon FB-43-1020 ferrite beads are used. Available from Amidon Associates, Inc, PO Box 956, Torrance, CA 90508

[7]See the photograph on page 79, October 1977 *QST*.

[8]The program *TLA.EXE* written by Dean Straw, N6BV, provides this capability. It is available with purchase of *ARRL Antenna Compendium #5*. ■

An Effective No-Ground Vertical for 80 and 160-Meters

Don Toman, K2KQ

A popular misconception about vertical antennas for the low bands is that they must have elaborate ground systems. Here's a vertical antenna for 80 and 160, fed with a single feed line that is simple, effective, and requires no ground system. You won't beat the 4-squares, but you will hold your own against a grounded quarter wave with ridiculous amounts of copper in the ground.

Rather than get into the theory of why this antenna works, I will simply describe it here and let the results speak for themselves. If there's a demand, I'll do a follow-up article on the relevant theory.

The antenna is a center-fed half-wave vertical with about 70 feet of vertical length with the remainder of the top and bottom of the antenna bent horizontal and parallel to each other. The antenna looks like a squared-off letter "C" fed in the middle of the vertical part.

Thus, the 160-meter antenna is a 270-foot dipole fed in the center with the bottom antenna wire bent parallel to the ground about 10 feet off the ground and the top at 80 feet off the ground. The horizontal parts are 100 feet long and parallel to each other.

The 80-meter antenna is a 130-foot dipole, fed in the center with 70 feet vertical and 30 feet horizontal 10 feet off the ground and 80 feet off the ground.

Think of it as an inverted L fed against an L. The two Ls are balanced with respect to each other and because the currents in the horizontal sections are out of phase, the antenna has a minimum of horizontal radiation.

The 80-meter and 160-meter antennas are separate—fed from a common coaxial feed line.

In my case, the 80-meter and 160-meter horizontal sections are about 30 degrees apart. The 160 horizontal wires run east while the 80 wires run east-northeast.

On both bands, the bulk of the current flows symmetrically in the center of the antenna, with the current peak about 45 feet off the ground at the feed point. On 80, the current loop peak is about 0.16 wavelength above ground and on 160 the current loop is about 0.08 wavelength above ground.

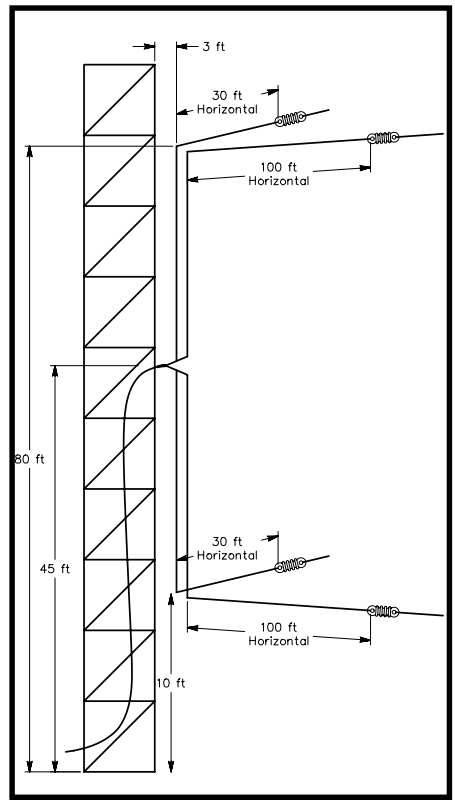


Figure 1—K2KQ's no ground dual-band vertical

The accompanying figure illustrates the antenna.

You can adjust the resonance of the antenna by adjusting the lengths of lower horizontal sections. The small asymmetry doesn't bother anything. The center impedance of mine at resonance is very close to 50 Ω on 160 and close to 70 Ω on 80. The 160-meter antenna presents high impedance at 80 meters and the 80-meter antenna looks like a parallel capacitor across the 50-Ω 160-meter antenna. The 160-meter antenna covers 1800-1860 kHz with under 2:1 SWR. I needed to take about 2 feet off the horizontal section to get mine resonant at 1830 kHz. If 80-meter current flows in the 160 antenna, it tends to flatten the current loop in the vertical section.

The 80-meter antenna is resonant at 3750 kHz with the 130-foot length shown. The VSWR is under 2:1 over the DX part of the phone band. It needs to have some length added to cover the CW portion. I haven't tried to bring it to resonance in the CW band, but have chosen to feed it through a tuner.

I originally had this antenna hung from trees. This year I put up an 80-foot Rohn 25G with three sets of guys. I hung the wires from ropes attached to the tower so they are separated from it by about 3 feet. The coaxial feed line comes off perpendicular to the antenna and is then taped to the tower. The center conductor goes to the top and the shield goes to the lower part. Before the coax turns on to the tower, I've wrapped some 30 feet of it into a coil. I expected to see a lot of interaction, but the tower and guys seem well off resonance at the operating frequencies and I didn't see any to worry about.

The first QSO on 80 was VK6LK, long path on SSB at sunset on September 12th. I've worked a few ZSs, HF0POL, LU and the usual Europeans. On 160, the first QSO was KP4SN on September 15th. In the couple of weeks since hanging it from the tower, I've worked ZS6UT, TU2MA, TL5A, VK6VZ, VK6LK, VK3ZL, NL7Z and the usual horde of Europeans on 160 with no fuss. I run about 800 watts out from a Ten-Tec Centurion.

Last January, I had about 200,000 points with 750 QSOs in the CQ WW CW 160 contest using the predecessor hung from trees.

(We wish to thank the YCCC newsletter "Scuttlebutt" *for allowing us to reprint this article from their December 1998 issue.)*

Propagation Indicators

Bob Brown, NM7M

Radio communication has been around about a hundred years now and three things have become apparent: (1) The earth's atmosphere is held in place by gravity. (2) Energetic photons and particles coming from the sun ionize it. (3) The ionosphere that results is held in place by the earth's magnetic field. So we're able to communicate from A to B when signals can span the path and at the same time come through strong enough to overcome any sort of noise on the frequency. But, as you well know, that is not always the case so we look for some variable(s) that would have a controlling influence on propagation to guide us.

Considering the vast extent of the Earth's ionosphere, it is rather amazing, perhaps the ultimate conceit, to think we can reduce propagation predictions to just a few variables, sunspot numbers and magnetic indices. Actually, that list is incomplete. There is no variable that is used to predict noise coming from low altitudes, only quantities related to the distant sun and how the solar plasma (made up of protons and electrons), streaming by the Earth, interacts with the outer reaches of the Earth's magnetic field. The easy way is to just say noise is man-made and leave it as a matter of "local concern," as politicians would say. But that begs the real question; noise can originate in the atmosphere and be part of the scene as it propagates just like any other signal of the same frequency.

Turning to the usual form of predictions, for maximum useable frequencies (MUF), sunspot numbers are thought of as a way to give us a measure of the ionizing radiation reaching the atmosphere. As the solar radiation is absorbed while going down through the atmosphere, the familiar F-, E- and D-ionosphere regions (going from top to bottom) are created. While the production of ionization depends on the flux of photons from the sun, resulting electron densities vary with height, in some relation to the ion-chemical reactions that take place here within the atmosphere.

Ionospheric sounding, which gives the critical frequencies relied on for MUF predictions, only gives electron densities at various critical points in the ionosphere overhead. Those few numbers have been found to vary, to a large degree, with the growth and decay of sunspot numbers. The resulting description of the ionosphere has been largely theoretical and worked up as models for use in calculations, say for the absorption of signals as they ascend and descend along a path.

But MUF predictions rely on the idea of Earth-ionosphere hops and place

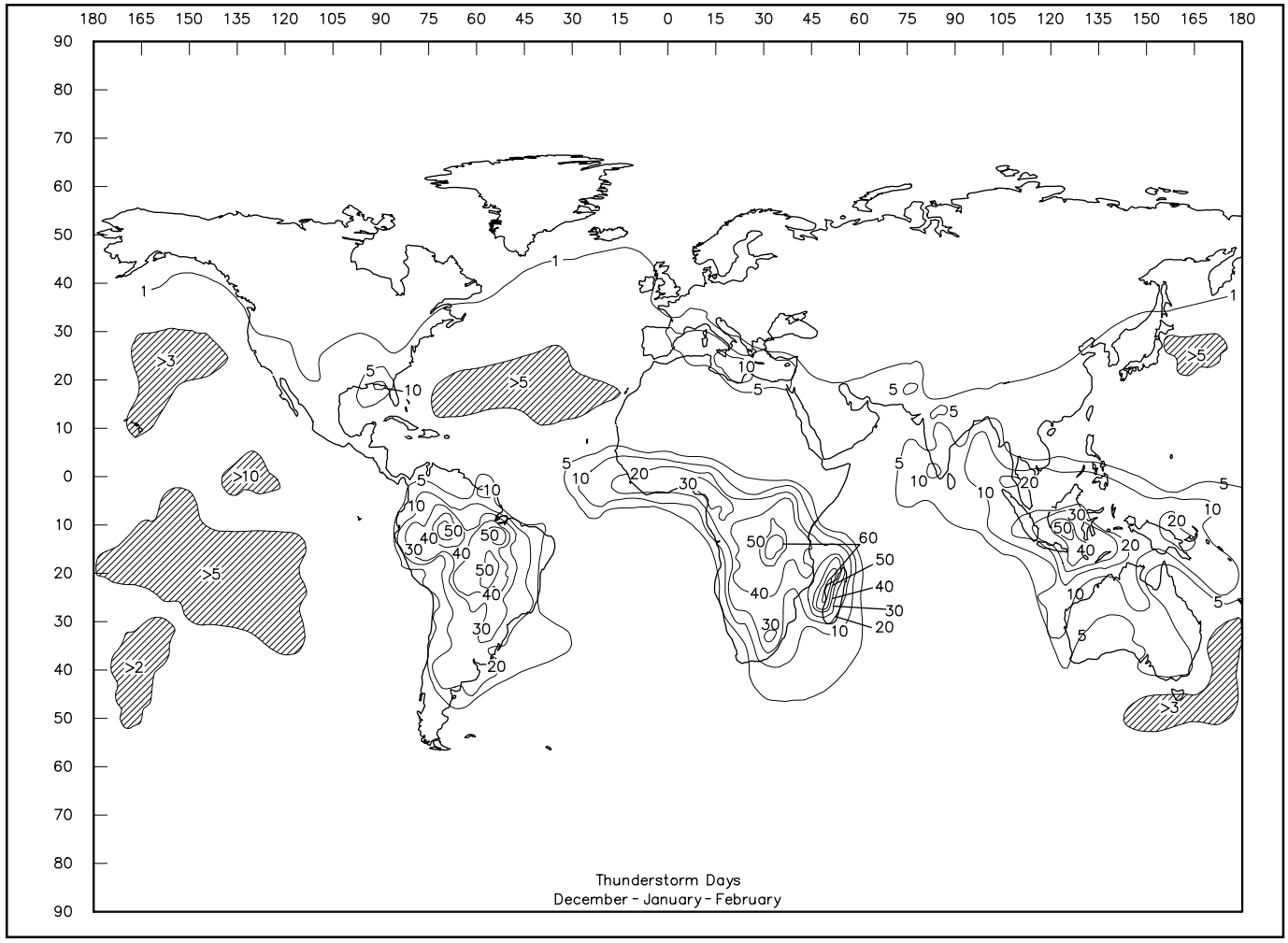


Figure 1—Frequency of occurrence of thunderstorms throughout the World (December, January, February).

ultimate control of propagation at the ends of a path. Thus, propagation is assumed to fail when the critical frequency for oblique propagation falls below the operating frequency at one end or the other. So critical frequencies are evaluated at about 1500 km from each end of a path; but nothing is done about the situation in between those points. By being incomplete in that sense, there can be problems for predictions on paths going across high latitudes or having more complicated mode structures, such as chordal hops or ducting.

Signal absorption results from RF waves exciting those ionospheric electrons into oscillatory motions, in the course of which they collide with atoms or molecules and transfer RF energy to the atmosphere as heat. While predictions of signal strength are largely from theoretical considerations, with reliance on the models for electron density along a path, laboratory experiments are needed to establish the orders of magnitude for the collision rate of electrons in the atmosphere. That work is required to bring absorption calculations down to the S-unit or dB level.

Over the course of time, efforts have been made to bring theory and experiment together, looking at how actual signal strengths compared to the best theoretical calculations. Alas, they have been found wanting, the result being a term "excess system loss" which gives the difference between theory and experiment. As a matter of fact, the August international body on radio matters, CCIR, even has a report on the subject (CCIR Report 252-2) that was published in 1970, giving the statistics of excess system loss of signal strength and critical frequencies of the ionosphere.

That report shows that signal strengths can be off by more than 20 dB, from fading and polarization changes, and critical frequencies can be off by more than 10%, from ionospheric tilts and such. Those differences vary with season, time and magnetic latitude of a path and show that even the professionals are aware of the problem. But what is the cause, you ask? Models assume a smooth, stable ionosphere but the reality is far from that. If nothing else, the ionization lies within a restless atmosphere which is always in some sort of dynamical motion at our level and surely it must be stirring and moving up at ionospheric levels.

Some operators express dissatisfaction with predictions, but they, themselves, are often the problem but in different ways. For example, if an operator's view of the physical world is in monochrome, ie, black and white, the mere idea of averages and distributions of quantities about such values may not sit well. As the saying goes, "I want it all now, and right, too!" The physical Universe does not always lend itself to that idea. So the statistics in that CCIR Report would suggest they would be unhappy even with the best of prediction programs.

Beyond that, MUF predictions are based on a critical frequency database using 13-month smoothed values of sunspot number. If an operator uses daily values of the 10.7-cm solar flux, converted to an equivalent sunspot number, that is a poor way to go and getting excited over a few points change in that number is unrealistic. It is better to smooth the input data or to log it and look for trends, like increasing or decreasing values.

In spite of those reservations about the methods in use, they do a good job, everything considered. Thus, the broad outlines of propagation prediction work fairly well, indicating times when propagation would be supported and also when signal levels would peak. The problems cited above have to do with the magnitudes or limits, how the operating frequency compares to the actual MUF on a path or whether the signal strength is sufficient to overcome estimated noise levels of man-made origin.

The magnitude of atmospheric noise power is more difficult to deal with because it is random and like weather systems. But there have been surveys of noise, going back to the time after WW-II, and world maps for the average atmospheric noise power have been developed by CCIR. However, those maps are neither readily available nor found in typical propagation software for Amateur Radio.

Consequently, our predictions or expectations of atmospheric noise must be derived more from our experience on the bands and rough outlines of thunderstorm activity on a global scale. Such experience is very personal, depending on where you live and the bands you operate on. Here in the Northwest, we're fortunate as we're about as far from centers of thunderstorm activity as possible. And by living on a small island, I enjoy a low-noise site but I have lived in large, metropolitan areas and do know what it's like to be deep in sources of man-made noise.

But atmospheric noise is generated by thunderstorm activity and three areas stand out in particular—around Indonesia, South America and Africa. There is a winter movement of thunderstorms to the south from those locations, beginning in September, which reaches the southernmost limits in the period from December to February, as shown in **Figure 1**. DXers trying to contact those regions in that period, or contesters operating from them, know the problem, its magnitude and variability.

So, of the three factors that global communication depends on—MUFs, signal strength and noise—only MUFs and signal strength have indicators that are useful in propagation predictions. Noise does not. Sometimes you realize the lack of the last one and other times you don't, but it is missing and prediction methods suffer for it.

Another weather-like factor is magnetic activity. It results not from atmospheric winds but from another wind of solar origin. Thus, the solar wind, plasma streams made up of protons and electrons streaming by the outer reaches of the Earth's magnetic field, can distort field lines and give rise to magnetic storms that also affect propagation. The magnetic A- and K-indices reported on WWV give a measure of those conditions, as noted at Boulder, CO. Ionospheric conditions at mid-latitudes tend to go bad or deteriorate when 3-hour K-values rise above 4 or A-values go above 25.

On a larger scale, the HF bands suffer badly when K reaches 6 and magnetic storm conditions are considered to be in effect for A above 50. Thus, MUFs drop on a wide range of paths and it takes days for the bands to recover.

On 80 and 160 meters, long-haul paths generally go across high latitude regions and propagation suffers from absorption by auroral ionization. On those bands, little DXing is accomplished when the K-index at auroral latitudes reaches 3. The best conditions are during magnetic quiet, K=0.

Finally, going back to prediction programs, the 10.7-cm noise flux has been used as a substitute for the sunspot number. But it is more of an indicator of active regions going across the solar disk; not the level of ionization in the ionosphere as its energy is far too low, by a factor of a million. A better indicator is the ultra-violet flux at the top of the atmosphere that would create ionization and affect propagation conditions. Unfortunately, that data is not available but there is one type of ionizing flux that NOAA reports daily on the Internet—the 1-8 Angstrom Ray background coming from the sun.

So get some logarithmic graph paper and start recording it on a daily basis. The levels of Ray flux are given by increasing orders of magnitude—A, B, C, M and X—and with multiplicative factors. Right now, the level is B1.1; for comparison, instrument background is A1.0 and typical values during the solar maximum in Cycle 22 were up around the C levels. The M and X values more often associated with short-lived Ray

fluxes during solar flares.

I started logging it again when there was talk of Cycle 23 sunspots showing up at high latitudes. I watched the sun sputter and fume, with brief squirts of X-rays until August 20, 1997; then the Ray flux rose like a shot by a factor of 10 to the B-level and has stayed up there since then. But more than that, it made frequent forays into the C-level, with excellent propagation conditions to match.

So, I know Cycle 23 is here! Now the next questions to come up are when it will reach its maximum and how high will it go. In that regard, it would be better that you check it out than rely on a prediction. OK?

I hope this gives you a better appreciation of the indicators used in predicting conditions for contesting or DXing. It is just not a simple matter but the more you know about how it works, the better you will be able to "read the tea leaves" Mother Nature puts in your cup. With time, you will come to rely more on the Ray background and magnetic indices. They are "here and now" and the sort of thing you need to know. They are indices that you can use with your "institutional memory" once you know when to look in different directions from your QTH. But that does require some experience.

Good Luck! ■

NCJ Profiles—From the Edge of the Western Plains—Steve Lufcy, K0OU

H. Ward Silver, N0AX
hwardsil@wolfenet.net

Back in the mid-Seventies from mid-Missouri, I learned (but didn't know I was learning) about the dreaded Black Hole of contesting. The contest would start and the only thing we could hear would be KH6BZF or KH6IJ on 20-meters. They were working stations world wide—we heard only them. We would actually go outside and check the tower to see if the CL-36 was still there.

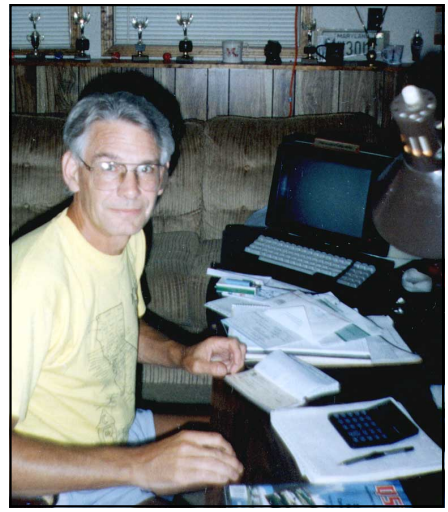
In such an environment, a contester that has "not missed a single CW and only one SSB SS since 1975 and just a pair of CW and one SSB Sprints ever" is a dedicated soul, indeed. Such a stalwart of the Kansas City scene is Steve Lufcy, ex-KM0L, now K0OU. Missouri guys—if nothing else, we're *persistent*.

Things are tough from the Midwest, particularly for DX contesting. "It is extremely difficult to be competitive in the DX contests from here in the heartland. We cannot get through the 'East Coast RF Curtain' to Europe and cannot beat the 'California Kilowatts' to Japan and Asia. However we can work some JAs that the East Coasters can't and we get some European openings that the West Coasters don't, so it is still great fun to stay in there and keep swinging." It builds character, a father might say.

Adversity is also a great breeding ground for companionship. The Kansas City crew is well known in DX and contest circles. "I joined the *KCDX Club* in 1978, mainly to have a group to turn in my contest scores with. The club has about one hundred members including about twenty active contesters. There have been some 'super-stations' built over the years including AB0I, N0XA (nice call—*N0AX*) and NX0I. The club is fun and social but the support for and encouragement in the contests has always been undertaken by a few hearty souls who are into it big-time."

"Domestic contests are a different story. We can put up a dipole and work everyone who is on from either side of the country. Because of this it is possible to be competitive from here in SS, Sprints, NAQP and state QSO parties."

"When the bands are long the east and west coasters are able to run rate by working each other and skip over us while we are weak or inaudible. This is especially prevalent on 10 meters when propagation is good. Also, when the bands are good for us, we must point our directional antennas one way or the other at the expense of the part of the country off the backside. However, we have been able to compete with much larger stations in SS, NAQP, and Sprints *because* of our location. This makes the domestic contests my favorites."



Steve Lufcy, K0OU

"I like the WPX contests—us smaller stations can look like 'big dogs.' I especially like the new rule change to let us work same-country QSOs for points since I can now work everybody, which is what I always like to do anyway."

Character builder or not, being active year-in and year-out from a somewhat tough QTH means the Top Ten boxes can't be the only means of motivation. "I like to see what I can do with my own stuff from this part of the country. I compete against myself, trying to beat last year's score and improve my skills. I also compete against other stations in this part of the country. I just like to support the on-the-air activities. Even if I'm not trying to compete, I will get on the air and turn in a log just to show my support. To me that is what it is all about—getting on the air and making contacts."

Steve has been on the air from all 'round the Show-Me State, starting out as so many baby-boomers did at the height of Cycle 19. "I was first licensed in March of 1958 as KN0OXJ in the Boot Heel of Missouri. I have QSLs from that time including one from KN3EST for the 1958 SS. After college, marriage, and one child, I got back into ham radio in 1973 and upgraded to WB0LFY in 1974. In 1981 I finally got through to Extra and received the call KM0L. This year I took on the vanity call K0OU in remembrance of my father, W3OU (SK)."

"My father and brother and gave me the motivation to get licensed—but I got into contesting on my own. My mentor who helped get me back on the air in 1973 was a friend of my father's who was a neighbor of mine in St Louis—John, W0ERZ. He gave me my Novice test and helped get me on the air. I got into traffic nets around 1975, as well." Midwesterners of that era will remember Ruthie, K0ONK, undisputed queen of the Missouri nets and the *BPL*. "I was net manager of the Missouri SSB net, Net Control Station for the CW net and liaison to *TEN* for many years."

Twenty-five years of contesting puts a lot of memories in the log—some more vivid than others. "In about 1983 or so (long before China was back on the air), I was operating a multi-op with the gang, and logged a slim signing BY4US. Well, since China hadn't been on the air in over twenty years, the guys gave me hell for it. Then, a few years later (and still a little gun shy), while working a European run with some calls from strong African stations, an extremely strong BY4OO calls me. I thought, 'Yeah, right! China calling me!' So I scratched the contact. Then after the contest, after I had sent in the logs, I found that it was legitimate. I had lost a great long-path QSO and new country for me. Now I log them all as I copy them and take my chances—I do not want to miss any contacts."

Steve's station minimizes the chances of missing those contacts. "After spending years seeing what I could do with older gear I finally upgraded to a 'real' radio in 1996. Station 1 is a TS-940S and a TL-922. Station 2 is a TS-430S and MLA2500B. I have a single 65-foot tower with a C-4SXL for 10 through 40, and a Hy-Tower vertical on Station 2. This setup is designed for versatility between two radios and for occasional multi-single operations. For years I have considered my station a training ground for the bigger stations. The newer contesters can come operate my city lot station, with a beam and a kW, before they go on to operate the bigger, more competitive superstations."

"My current contesting partners are K0RWL and K0VBU. We have been contesting together for over twenty years. We organize and operate most of the multi-op operations in this part of the country. We have been doing multi-op in SS from my station pretty successfully—

making the boxes in CW SS the last three years."

New contesters are a hot subject these days, especially with the Kid's Day event putting youngsters in front of the radio. "We have mentored some newer ops such as 11-year-old Rebecca, KB0VVT. She came over and operated Kid's Day not long ago, generating the biggest pile-ups I have ever heard from my station. I jumped up and down and cheered. I wish I could stir up that kind of excitement on the bands!"

"Contesting is on solid ground and growing right along with the number of ham licenses being issued. There are many of the new hams that are like me—with limited resources, but who want to see what they can do with what they have. These folks inevitably end up contesting as a way to play and experiment with whatever toys they can afford to acquire."

"I have headed up the club's Field Day for the last ten years and the members consider me the Great Motivator. I jump around at club meetings and rant and rave about all the great operating we are going to do. I get really excited because we are not only going to get on the air, but we are really going to show it off!"

"I have figured out that I don't really care who I work, as long as there are lots of them!"

KM0L at 2nd operating position

"There certainly seems to be more calls to work in the contests now than there were last year, or the year before, etc. I see the interest in HF radio and contesting growing with the number of sunspots. Technology is absolutely helping! More toys to play with, making it more fun. The Internet has created a new way to find folks who want to make radio contacts. These all help to make it more interesting and fun."

Infectious enthusiasm, isn't it? I think Steve speaks for most of us when he says, "Getting on the air and making contacts excites me. I am a real cheerleader for any and all on-the-air activities. If it entails turning on the two-way radio and saying (or sending) something into it, then I get excited about it." ■

Propagation

Carl Luetzelschwab, K9LA
k9la@gte.net

Planning

K9LA

Back in February, our Editor, Dennis, K7BV, contacted me to see if I would provide some propagation planning for his trip to Finland. He was mainly going to operate as OH0Z in the WPX CW contest (May 28 and 29), but he also planned some "casual" operating as OH0/K7BV and OJ0/K7BV before and after the contest (I think his idea of casual operating is anything less than 20 hours per day). I readily agreed, and put together a little propagation book for him to look over beforehand and to take with him to OH-land.

The propagation book for his operation consists of seven figures with some pertinent words about each figure. Let's see what I did for Dennis (or was it what I did *to* him?), as it may give you some ideas for propagation planning for your next DXpedition or contest. The actual figures that I'm describing in this article can be seen on the *NCJ* Web site **http://www.vramp.net/~ncj/**.

Figure 1 is an azimuthal equidistant map centered on OH0, with headings to major contest populations indicated on the map. This helps when you're many thousands of miles away from home. It should be studied beforehand, and posted at the operating position, too. This avoids the embarrassing question "*Which way is* XX*?*"

OH0 is right at the edge of the auroral zone when the k index is about 2. Thus **Figure 2** is the same map as **Figure 1**, but with the auroral oval at k=2 superimposed on it. It highlights those headings that pass through the oval at k=2—these could be very tough paths. It also highlights those paths that could be in trouble if the magnetic field becomes disturbed and the auroral oval expands towards the Equator.

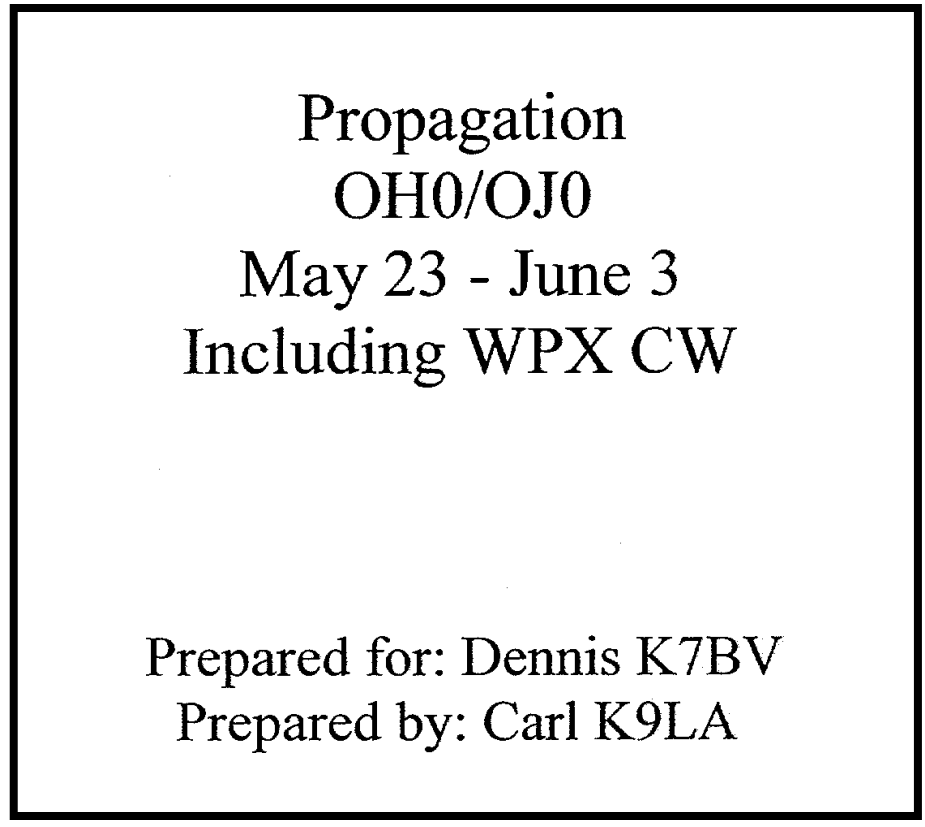
Figure 3 is a colorful spreadsheet showing when the 40 through 10-meter bands were predicted to be open to various areas of the world. This was intended for the "casual" operating periods from OH0 and OJ0 before and after the WPX CW contest. Green indicates a good chance of propagation, blue indicates a fair chance and red indicates a poor chance. What I considered good, fair or poor was a combination of availability (the probability that the operating frequency was below the MUF) and a minimum desired signal strength.

Figure 4 is also a spreadsheet, and it showed Dennis when to expect 160 and 80-meter openings to various areas of the world. Again, this information was intended to be used during the "casual" operating periods, but it also could be helpful during the contest for multiplier and limited running efforts. It is based simply on when there was darkness all along a path. North America was broken into call areas. The West Coast did not have any common darkness, while the East Coast had almost two hours.

Figure 5 is a band plan for WPX CW. From Europe, the WPX point structure favors working the US and JAs. The band plan shows the best and second best band to be on for each hour to maximize Qs into those areas (see page 7 of the July/August 1998 *NCJ* for more details on this planning method). What I provided for Dennis included a band plan for quiet magnetic field activity, for moderate activity, and for high activity. In retrospect, it could have been done just for "quiet" and "not quiet"—the only real difference was that "quiet" gave a shot on 15 meters during the day, while "not quiet" meant 20 meters would be the round-the-clock workhorse band.

Additionally, I suggested two other interesting possibilities for his contest band plan. First, I reminded Dennis to look for auroral-E openings to North America on the higher bands (15 and 10 meters) from 2000 to 0200Z (see page 14 of the March/April 1999 *NCJ* for more details on this less-common mode of propagation). Second, I pointed out that there were times when the best band and the second best band are the same band—meaning one band would be open to both the US and to JA at the same time. This suggested pointing one antenna at the US and one at JA and feeding both at the same time. Dennis did take advantage of the OH0Z antenna farm and did just that with good results.

One thing I should have done was to indicate times when 10 meters might be open—regardless of the fact that the probability of 10 meters opening was very low to most areas of the world. His OH0Z log did show a handful of 10-



The actual figures can be seen on the *NCJ* Web site http://www.vramp.net/~ncj/.

meter Qs (several EUs, one each with VK6 and JA) on Sunday morning. Dennis takes some of the blame for this low number of 10-meter contacts; suggesting that had he been more "alert," he would have checked the band more often for short openings.

Apparently, he had only slept about 20 out of 105 hours in the days prior to the contest. He sent me this excerpt about the contest from an article he wrote about the trip to the northern latitudes.

"17½-hours later I took my first 2-hour break. Ari had provided a foam rubber mat to lay down on. From that point on the contest is little more than a blur in my memory—so you will be saved from having to live the minute details of the adventure. I do recall being visited by pink elephants and some dinosaurs sitting on top of the rig. My paddle intermittently resembled a giant silver spider and would leap up at me—but other than those distractions I was just fine! Sleep deprivation is powerful stuff…"

How'd the band plan do? With the k index averaging just over 1 for the entire contest period (more on this later), 15 meters should have come through big time according to the k=0 (quiet) column of **Figure 5**. And it did—44% of his Qs were on 15, 38% were on 20, 14% were on 40, and the remaining 4% were on 80 and 10 meters.

Figure 6 is a table of times for possible long path openings to several areas of the world, mostly Oceania. Dennis requested this for his "casual" operating times, so I supplied it.

In my humble opinion, the level of magnetic field activity was going to make or break this operation. This was apparent when looking at **Figure 2**. If you haven't already done so, now would be a good time to read the accounts of contesting near the auroral zone by KL7RA and OH1EH in the May/June 1999 *NCJ*.

In an attempt to give Dennis an inkling of what was he was going to experience, **Figure 7** plotted the daily k sums from the high latitude Meanook, Canada observatory beginning February 1 and continuing to May 15. The 27-day solar rotation period was identified, and the data suggested that the WPX CW contest could fall during an active period. But this was tempered with the fact that the equinoxes (March and September) are the most active periods, and magnetic activity decreases to a broad minimum in the summer months (June and July)—so the end of May shouldn't be too bad. As it turned out, the contest period was quiet. The k index was 2 or below during the entire period, and was 0 for several 3-hour periods. Thus 15 meters came through big time.

By the way, Dennis set a new Scandinavian CQ WW WPX CW SOABHP record from OH0Z while making use of the tool described above. *Need I say more* about good propagation planning before a contest?

One final comment—I intentionally did not get into the nitty gritty details here, nor did I give all the background material. That is another project for another time. But I hope it gives you some ideas—planning your operating requires more than just blindly running propagation predictions and wondering what to do with them. ■

Contest Tips, Tricks & Techniques

Gary Sutcliffe, W9XT.

Domestic Contests

W9XT

Respondents to this month's topic voted the ARRL Sweepstakes as their favorite domestic contest. W2GD, K2UA and N0AX note the tradition of this contest. SS is certainly one of the oldest and most popular contests. WA3SES lists the CW SS as his favorite contest. Ed thinks it might be because it was the first contest he ever got a certificate for. KN7T and N2GA go out for the Clean Sweep.

Domestic contests offer the ability to do things just a bit differently. Some operate just to see if they can get a Clean Sweep. Usually there are a few each year who try to work a Clean Sweep with the minimum number of QSOs—just one per section.

K8MR has been trying something different. In recent years he has operated from a number of stations with just a few hours at each station. Jim says it is a blast being a new guy all the time. Last year he operated from six different stations—just a few hours at each one. His goal is to have the sum of all station scores beat the winning op. Jim was unsuccessful in doing that last year, but he did make more total QSOs than any other person.

K6BZ used to only operate DX contests. Jerry has rediscovered domestic contests. He likes the fact that you can make lots of contacts even when the sun spot counts are low. He also feels that more non-contesters get on for domestic contests because they are less intimidating. Because of this, domestic contests provide an opportunity for recruiting.

SS Strategies

W2GD's basic strategy is to work the highest band that is producing 60 or more QSOs per hour. John usually starts out in Search and Pounce mode at the beginning of the contest, working mostly stations west of the Mississippi River. At that point every station is a new one and you can get some very high rates that way. John also notes that if he is lucky he can also take care of some of the more difficult multipliers such as KL7, VE8, VE4, VE5 and VE6.

WA3SES does not go into SS expecting to win, but to have a good time. He really enjoys it when he can find a hole someplace and get a good run going.

In recent years the low power and QRP classes have attracted some of the top-notch contesters who are looking for a new challenge. W2GD has operated SS CW in the QRP class a number of times just for the challenge. He likes QRP because there is never a slow time. He also feels that this class requires you to use all of your contest skills including running, S&Ping, knowledge of propagation, etc. John feels that even with 5 W you can still CQ 50% of the time. N0AX also likes QRP in SS, but will go low power if conditions are expected to be poor.

The Sweepstakes, especially CW, were my favorite contests for many years. After several years in the high power category I felt that it had really become a CQ marathon. I find that boring. I have not been able to operate SS much in recent years due to some other non-radio events that occur on those dates, but when I can, I often go low power. It has renewed my interest in this contest. One thing that I have noted is that when you call CQ you work mostly low power and QRP class stations. You work mostly high power stations when you S&P. Many low power and QRP stations make the mistake of not trying CQs enough, and miss out on working a lot of other low power stations.

KN7T notes how packet spots have changed the flavor of SS. Mark prides himself on being able to find weak stations from rare sections and work them before everyone else. Now there are instant packet pile-ups on them.

I have noted a similar effect. My technique for getting KL7 and VE8 used to be to point my beam up that way and call CQ. Invariably I would get them within 10 minutes or so. I talked to KL7RF about this one year at Dayton. Rich said that no one ever pointed their beams north, and no one ever heard them. Someone CQing with a beam that way would stand out like a beacon. Now the KL7s and VE8/VY1s can call CQ and have huge packet pileups even with a very weak signal. With everyone trying to get a Clean Sweep for a coffee cup, the pile up sounds like the first day of a Heard Island DXpedition!

KF3BE is relatively new to contesting. George uses domestic contests as a way to work on his 5BWAS awards. He is discouraged by the low QSL return rates he gets from contest QSOs. George feels that many hams who are using contests to work on awards are being turned off by contesting because of the low QSL return rate. He suggests answering QSLs might possibly be a technique to encourage activity and enhance contest scores.

According to K2UA and W2GD, you really need to run SO2R to be at the top in domestic contests. Adding a second radio is not too expensive these days. A lot of new radios with HF and one or more VHF bands included are coming out at very modest prices. This is helping to lower the prices for used HF rigs. Gear that was considered upper-tier contest equipment five years ago is now very affordable.

Setting up a SO2R station requires a fair amount of additional hardware in the form of filters to prevent inter-station interference and switching systems. K2UA says these can be assembled for relatively low cash outlay if you are willing to build things yourself. Rus goes on to say that he enjoys the contests more with SO2R because he feels that the station does not limit his ability, but rather it is the other way around.

Other Domestic Contests

The Sprints are also popular domestic contests. These really require a lot of skill to do well. W2GD calls the Sprints "The *Contester's* Contest." N0AX likes them because they really tax all of your contesting skills.

The NAQP contests are also becoming very popular. N2GA and N0AX like the fact that they don't take up the whole weekend. I really like the format of the contests, but find that the weekends selected for them rarely work out for me.

State QSO parties were also mentioned as favorite domestic contests. WA3SES mentioned the Pennsylvania QSO party. Ed feels that he has an advantage in this one since he can operate from a fairly rare county. KN7T likes the *Washington State Salmon Run* because of the chance to compete with nearby friends for bragging rights.

I really enjoy the Wisconsin QSO Party. It is fairly short, just 7 hours. It does not tie up a whole weekend, but it's long enough that it is not over by the time I get warmed up. In the one last March, I averaged 93 QSOs/hour. This was a mixture of phone and CW contacts. There are few other contests that I am able to

manage more than one or two 90+ hours, so this is a real treat.

Domestic Contest Antennas

One of the advantages of domestic contests is that low antennas work very well. In fact, high beam arrays that are great for DX contests are often less effective than low, smaller antennas.

Many big gun stations put up low dipoles just for domestic contests. W2GD has a special antenna for 40 meters. It is a dipole with a reflector under it. Essentially it is a Yagi pointing straight up. John feels that this is a killer antenna for stations within 600 miles or so. John notes that this was popularized by K3LR in an *NCJ* article in the early 1980's.

W2GD and N0AX, operating from different coasts, note that they can simply point their beams to the opposite coast and pretty much leave them there the whole contest. Those of us in the middle of the country have more of a problem. The bands are often open in multiple directions at the same time. Here at W9XT I get around that problem with multiple beams. On one tower I have a TH7. The other tower has a pair of small tribanders. By using a couple of WX0B matching boxes I can feed them in any combination and be effective when 20 meters is open to the southeast and west at the same time.

Several contesters warned against verticals. W2GD felt their take off angles were too low except for working the KH6s. K2UA recommends removing the coax from your verticals and putting up low dipoles for the domestic contests. N0AX has compared small 40-meter beams with vertical arrays and likes the Yagis better. Note that all these guys are located on the coasts, and an omni-directional antenna would spread half the power over the ocean. That won't be the case in the center of the continent, but you still have to be concerned with the low take off angle. Half your power may end up in the Atlantic and the other half in the Pacific! I have a low dipole and a shunt fed tower for 80, and find times when both are useful.

KN7T likes his 20-meter vertical loop fed with 450 Ω ladder line. Mark likes the broad SWR bandwidth. W2GD uses Beverage antennas on receive for many bands, but mostly 40 and 80 meters.

That wraps up this installment of CTT&T. Thanks to K2UA, K6BZ, K8MR, KF3BE, KN7T, N0AX, W2GD, and WA3SES for their thoughts on domestic contesting.

This is the 75th installment of CTT&T—some sort of a landmark I guess. My goal over the years has been for every reader, even the most experienced, to pick up at least one new idea to try in an upcoming contest. We have covered a lot of topics in this time.

I'm starting to run out of ideas for topics! Please send me your suggestions. I especially appreciate topic suggestions from contesting newcomers! Here is your chance to get advice from the more experienced!

Topic for November-December 1999 (Deadline September 10)

The Search for the Lost Decibel

Now that you've been using the same radios and antennas for a while, where do you find the extra decibel to give you the edge over the competition? What surprising discoveries have you made in your quest for ultimate station efficiency? How much is an extra dB worth in extra QSOs or multipliers? How much would you be willing to pay for an extra dB in transmit signal strength? How much for an extra dB in S/N on receive? If you could improve your beam by a dB in either forward gain or F/B, where would you put it? How many dB does it take to reach the next lower tiers of stations?

Topic for January-February 2000 (Deadline December 10, 1999)

The first CTT&T of the new century! Let's take a look back.

Please describe your contesting 25 years or more ago. What kind of equipment did you use? What strategies did you use back then? What did you consider good rates, and QSO or multiplier totals? Were those the good old days, or are they now?

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. ■

Correspondence

Dear *NCJ*,

I still remember how the crowds used to gyrate in the Sixties. From Mike Echo to Whiskey Alfa, from Florida Lima to Mike November, and even in the Big Apple, November Yankee, they were chanting, "*I wish they all could be Charlie Alfa Girls*." This was also the time of the Tupelo Mike Sierra Flash.

Sounds crazy? Sure does!

Then why do so many phone operators use these silly exchanges in the ARRL DX and 10-Meter Contests? Using the official State name is much less ambiguous than using two-letter abbreviations. It's far harder to distinguish under difficult conditions between MT and MN than it is to distinguish between Montana and Minnesota!

The absolute pits are those that use both: "You're 5 by 9 in Pennsylvania, Papa Alfa." *I know how to abbreviate Pennsylvania*, thanks!

I'm not sure what the origin of this misguided practice is, but it's a recent phenomenon. I assume it is a sign of the times. Everything has to be made easier so no one fails. School standards drop all the time, and ham radio has not escaped either. While the Bash book was frowned on in the Seventies, its successors have become the official route into Amateur Radio.

Whose responsibility is it to get the correct abbreviation into the computer? Is it the sender or the logger? I would contend that the logger bears the responsibility. Learning the multipliers is part of the preparation for the contest, just like learning the rules, building antennas and reading that new radio's manual. In fact, the logger doesn't even have to get it quite right, as I see that my logging software also accepts KA for Kansas and KE for Kentucky!

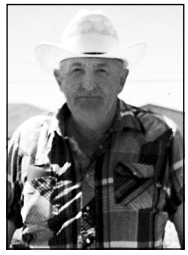
What's my point? My point is that I would strongly encourage everyone to return to the simple way. Just give your RST and state, in a format that your non-ham neighbor would recognize. That way, we can all make more QSOs.

I realize that I'm probably preaching to the choir in this forum, but I'm sure the little guys will abandon the nonsense in due course if the CQ machines on 14150 would set the example.

73, Chris R. Burger, ZS6EZ
crb@nanoteq.com

Contesting for Fun

By Ron Stark, KU7Y
ku7y@sage.dri.edu


KU7Y

In this issue I'd like to present two different recaps of Field Day operations. We all know that Field Day really isn't a contest but it *is* a great place to expose new operators to the fun of contesting.

The first one is the story of a serious operation by some serious operators resulting in a very good score. Compare this with the second story of an operation that had FUN as the only real goal.

Maybe more of us should think about the second style. Let the new operator just get on and have fun. Set the software up for general QSOing so it will take whatever they manage to type. Make it nothing but fun for their first time in the barrel! They will see where they are weak and if they have enough fun they just might be motivated to "fix" those weak spots. The solid logging and high rates will come with time. Just keep it fun.

Here is the story of N4BP and K4PG, better know as the "Guano Reef Bashful Perverts" as told by Bob Patten, N4BP.

"CQ Contest... "

The entire weekend went pretty much as planned, which was good and bad. The station went together easily, there were no equipment breakdowns, the weather held, the air mattress held, the bugs were tolerable. But, where last year we ended in a tie for first place for all single transmitter stations, this year the best we can hope for is second place. Congrats to the Tampa Amateur Radio Club, organized by W4ZW, for a terrific showing from W4AC!

We began setup at about 1600Z, therefore limiting our operating time to 24 hours. First, the trusty old "ugly vertical" went up with my usual dive into the Gulf to secure the offshore nylon guy to an underwater rock. This year, we put up a DK9SQ 33-foot fiberglass mast and used it to support a 40-meter dipole. This netted us *many* more Qs on 40 than last year with only the vertical. We used my TS-130 for all but one QSO. The new IC-706MKII in a mobile setup with Hustler and multiple resonators netted us one RS13 satellite QSO during the last five minutes of its last available pass! A 110 A/hr deep-cycle marine battery that was previously charged from a 2 A solar panel powered the Kenwood and a 486 notebook computer running the *NA* logging software. The battery went the full 24 hours and still seemed to have plenty of juice left.

Kevin kicked it off on 15 CW while I put up the 40-meter dipole. Throughout the event, we both felt that we were doing considerably better than last year. I'd like to think that re-doing the radials for the vertical and adding the 40-meter dipole made the difference, but more likely the improved conditions were entirely responsible for our 150 QSO improvement over last year.

We had a K10 PIC keyer and *NorCal* paddle set up for the public and several visitors got a kick out of sending their own CW. An Italian couple stopped by and understood "Morse" and "SOS," but otherwise we had a difficult time communicating. Speaking of visitors, a couple of strange coincidences took us by (pleasant) surprise. Jim Anderson, co-worker of Grant, N4GM, happened to be camping at the same *KOA*. I had tried to coax Grant into joining us earlier in the week. So, we sat Jim down at the operating position on Sunday afternoon to fill in for Grant. Also, two of my good friend, WA4YLD's grandsons stopped by. They started asking if we knew this ham and that ham, and of course we did. The two boys had started studying for ham tickets, but got sidetracked by other interests before they were able to get their licenses.

I made one error in operating that could well have made the difference between a first and second place showing. I found that coiled-cord thingee with the cooling fins on the front and started talking into it. People started talking back to me and I ended up logging about 50 QSOs. After my second phone session during the last hour, Kevin got back on CW and pushed the *NA* rate meter to over 100/hour! Next time I'll leave the mike at home!

All in all, a quite successful outing. We had some light rain and almost constant overcast—a blessing since it kept us from roasting. Mosquitoes were occasional visitors, but a minor annoyance. We completed breakdown of the station within 30 minutes after our 24-hour period ended and hit the road.

We stopped for our usual "victory celebration" at the *Dairy Queen* in Key Largo and then headed for our respective homes.—Bob Patten, N4BP

And here is the Fun Day story as told by Mike Truax, KB9OCE

Field Day or Fun Day?

I have been a member of Porter County ARC (Indiana) for only a few years now. During past Field Days I have seen much competition going on, which at times got hot and heavy. This year, the club decided to do something a little bit different. We decided to have fun!

It was rather easy to take that stance this year. We had just participated in a statewide emergency drill about a month ago. Our efforts in that drill are still being praised by county officials. We are scheduled to take part in another one in September, and then again in November, so this Field Day we were out to enjoy each other's company and have fun, something we don't often get to do. In retrospect, I can't help but wonder how many hams have had heart attacks that may be induced by—or can be attributed to—Field Day activities. None in our club this year, that's for sure.

The fun began a little differently than in the past. We set up at the same place we did last year, but this time Dr. Bill, N9LL, had his newly purchased motor home there for us to operate in, complete with battery power, two generators and air conditioning. Gary, KB9OLZ, our EC, had to get there early to hold the spot for us—the park does not accept reservations. We had more antennas and towers set up than ever before. Dr. Bill had several rigs set up as well. I don't know if anyone knows how many of the rigs and antennas were actually used—we didn't care; we were out to have fun! Dave, W9NNK, brought his HF rig and operated exclusively CW all weekend. I was not able to copy most of it. It seemed to be coming in much of the time at 35-40 wpm, but it was fun trying.

"*Points? What's that?*" was the battle cry this year. It was decided just to operate for fun—we *did* and it *was*. We had a mini-picnic on Saturday with my famous Buffalo Wings. A big picnic followed on Sunday with a huge spread, but a lot of the members couldn't attend—they were working the *American Cancer Society* Bike-A-Thon with the *Calumet Crank Club*. They helped raise $30,000! The money goes to local cancer patients to be used for their medical bills.

Saturday and Sunday we also had a mini-hamfest that ran the entire 24 hours. Many goodies were purchased by those in attendance, with all proceeds going to the club. There was a steady stream of both modern and WWII era equipment coming in and going out throughout both days.

Contacts? We made quite a few. How many is hard to say since there weren't many records kept. No one really cared as we were out to have fun and we did! What was really fun was when we signed off with a station, we would say "*Have Fun,*" then listen for their reaction. Hopefully it got the message across that Amateur Radio *is supposed to be fun*. I know it was for us!—Mike Truax, KB9OCE

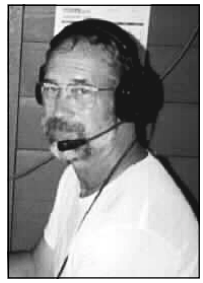
I hope you will focus on having fun while contesting. That means something different to each one of us—but whatever it is, do not lose sight of it or we will be reading about you in Tom, K5RC's, column "*Where Are They Now?*"

73, Ron, KU7Y ■

Contest DX-Ventures

The Contest Traveler

Joe Pontek, K8JP
v31jp@logical123.net



K8JP

Well, how are your plans proceeding for your next—or first—Contest DXpedition? As you read this, you should be well along the way with your airline and lodging reservations made, your packing list should be finalized and your equipment checked out. As soon as I complete one trip, I start planning for the next one. As ideas or thoughts come to mind, I enter them in the trip plans to be either implemented or discarded later.

Even if you can not make a trip this year, the exercise in planning is good for the eventual trip and it helps keep your enthusiasm up. Even last minute trips are great. Perhaps you'll out from your boss that your vacation bank has a week that will be lost at the end of the year if you don't take it—go for it. The last minute scramble to make arrangements is good for a rush. A simple single band effort is easy to plan and implement. That leaves more time for fun in the sun, also!

In response to my request for DXpedition-friendly antenna information, here is a response from *GAP Antenna Products*;

"DXpedition friendly" is an interesting term. I guess this would all depend on where you are going and how you intend to get there. Most commercial airlines will accept any of our antennas. Each comes packed in the same size box. This box measures 105 x 9 x 2 inches. The antennas vary in weight from the *Titan* at 25 lbs, the *Challenger* at 21 lbs, the *Voyager* at 39 lbs and the *Eagle* at 19 lbs.

When approaching an airline, I generally tell our users to ask if the airline accepts surfboards or cross-country skis. If they do, then chances are good they will accept our antennas as well.

This airline theory is fine for the simple DXpedition. For atypical scenarios where one may find themselves crammed into a small *Piper* to reach that outpost in nowhere, this may not be the case. For these folks, we have been known to offer cut down (or should I say a cut up?) versions of our products. For a $100 to $150 charge, we can reduce the component size to better suit your needs. This includes cutting as well as sleeving. The smaller the final end product the greater the cost.

One suggestion I would add is that if you plan on disassembling and reassembling our antenna frequently don't use the supplied self-tapping screws. To assemble our antennas, a larger diameter tube is sleeved over a smaller diameter tube. At the same time a large 1/4-inch diameter hole in the outer tube is aligned with a smaller 1/8-inch hole in the inner pipe and a self-tapping screw is inserted. What I recommend instead is using a drill to increase the hole in the inner tube from 1/8-inch to 1/4-inch to match the size of the outer hole. Now go to the local hardware store and purchase some 1/4-inch stainless bolts and wing nuts. Since all our holes are through-drilled, use of these bolts is possible and it makes it much easier to disassemble and reassemble the antenna.

A *GAP* antenna makes a pretty good DXpedition unit, if for no other reason than it is comprised nearly entirely of aluminum tubes and coax—there is very little that can fail. Another nice feature is there is no tuning. Once it is assembled, you are on the air. Not only can you operate, but with the exception of the lowest band for each model, you can work the entire band. This would certainly be a plus for single ops that want to work both the CW and phone portions of the band without requiring adjustment of their antenna! Couple one of these products with our *Quick-Tilt* mounts and you're all set.

Sincerely, Richard G Henf

Thanks Richard! Now—the conclusion of Dennis's great article series.

Contest DXpedition Planner —Part Three of Three

Dennis Ashworth, K7FL
Ashworth@ashworth.org

In the last issue of NCJ *we presented the second installment of a three-part series on planning for contest DXpeditions—big or small—by Dennis, K7FL. Part two covered general planning, responsibilities, team communications, tools and supplies, team welfare, rules and conditions, motivation and pre-contest site time. Dennis's Planner will ultimately find its way onto the* NCJ *Web site Contest DXpedition pages to join the other planning data already residing there.–JP*

Monitor and Manage

Have you planned to tightly monitor all band rates during the contest? If band rates are low, can you quickly identify, diagnose and take corrective action?

Do each of your station operators have a contingency plan in the event of antenna or equipment failure?

Can you switch quickly to paper logs if the network or a PC fails?

Do you have a plan and the materials to address inter-station interference if it should occur?

We monitored band propagation and rates very carefully. Charts were created (thanks to Hank, KR7X) for predicted propagation and operators were expected to know where the band should be open to at any given time. We polled rate data per band and measured results against our objectives. This proved the right approach, but the interval between checks was found to be too long. These checks should be made early enough that emerging trends can be detected and acted upon. Next year, we will dedicate a computer for crunching rate data instantaneously so decisions can be made earlier, while there is still time to impact a trend. This is absolutely critical when applied to bands experiencing short openings.

We also learned the value of planning for failures should they arise. Our 40-meter amplifier failed three times during peak 40-meter operating times. This is a critical band where power is important, especially in Europe. However, we ran barefoot on 40 meters while trying to repair the amplifier. Meanwhile, we were running an amplifier on 10 meters getting few Qs. It's embarrassingly obviously that we should have moved the 10-meter amplifier to 40 meters, but no one acted. A "what-if" plan for failures in equipment, antennas and computers is well worth the effort should such failures occur.

This also eliminates time-wasting negotiation and debate if equipment must be pulled from one band-team to support another.

Think International

If you are participating in a multi-national team, consider letting team members communicate to their native countries—they may receive more support from and have a better understanding of their countrymen.

Divide work groups into common-language groups to allow better communication.

Are you knowledgeable of any of cultural issues among your team members?

Whenever possible, we matched team members to band openings into their native lands. This helps reduce repeats and gives operators a chance to experience pileups from the "other side." It was great to work friends from home.

We will probably deploy antenna assembly/raising teams with sensitivity to language abilities. This will help avoid language issues should we need to react quickly during antenna raising. You've not lived until you've heard people shouting instructs in four or five different languages while trying to tension guy lines!

We had few cultural issues that caused problems, but one situation did arise. I planned to hold a short business meeting and update while we ate dinner. Given all the cell phone interruptions and group chatting, it seemed the best time for me to update the group was when they were chewing on something. When I started the meeting, I knew immediately by the blank stares that something was wrong. Then one of the Italians explained that business is *never* discussed while eating pasta!—I shut up.

Those Dreaded Post Contest Jobs

Are you leaving the site in the same or better condition than when you arrived?

Have you planned ahead so you can answer QSLs swiftly?

Have you arranged for a post contest review with all team members—before anyone departs—to capture areas for improvement next year?

The message here is simple: contest activities do not end at 0000Z Monday. Disassembly and cleanup, while requiring less time than station assembly, still requires labor. Be sure a sufficient number of operators are available for this task.

Another important post-contest activity is a group debriefing. This is intended to capture input from team members on what worked, or didn't work, during the operation. This should be expanded to include not only the contest experience, but all activities associated with the operational planning and execution. The debriefing is best completed while on site and the experience is fresh in everybody's memory. Input from the debriefing is critical in planning the next operation.

Miscellaneous

Have you considered appointing a dedicated photographer to take photos before, during and after the operation?

Have you established a local contact (preferably a ham) that can help with local issues?

Have you asked team members for their objectives?

Consider posting team member biographies and pictures on your web site so members can "meet" each other before the contest.

We nearly forgot to take a team photograph, and when we finally did, we were missing a member. Designating someone to think about such things will help ensure that pictures of the operation are available for future enjoyment.

Consider asking team members to list their personal objectives. In other words, what would make the operation personally satisfying? This concept permits organizers to tailor roles and responsibilities, which met individual as well as team needs.

We also required team members to submit a photo and a brief biography, addressing family, occupation and radio activities. This helped acquaint members in advance of our meeting on site.

Closing Remarks

Special thanks to Jan, ZS6NW, our IH9P Contest Czar. Jan provided the initial outline for this checklist. Thanks also to the entire 1998 IH9P Team who contributed substantial input before, during and after our operation. Our collective goal is to see others freely contribute to this list by adding their "lessons learned."

73, Dennis, K7FL

Thank you, Dennis. Well, that's it for this issue. Good traveling and remember, it's all about having fun! When Murphy shows up, smile! It screws up his day! —73, K8Joe "Palooka"/V31JP ■

Contest DXpedition List

Dennis Motschenbacher, K7BV

This is a listing of Contest DX-Ventures scheduled for upcoming contests. Visit the *NCJ* Web site **http://www.vramp.com/~ncj** to view the most current update of this list. Please send corrections and additions to me via e-mail or my home address listed in the front of this magazine.

Contest	*Category*	*QTH/Call*	*Operator(s)*	*Status*
1999				
WAE DX CW	SOAB	WP2Z	KD4D	Firm
CQWW RTTY	M/M	HC8N	N5KO, K6AW, W6OTC +	Firm
CQWW SSB	SOABHP	8P	W2SC	Firm
CQWW SSB	SB/160	FS/N7KG	N5KG	Firm
CQWW SSB	SOABHP	HC8A	N6KT	Firm
CQWW SSB	SOABHP	KH2/N2NL	N2NL	Firm
CQWW SSB	SOABHP	NH7A	W6QK	Firm
CQWW SSB	SOAB?	PJ7/N7KG	N7KG	Firm
CQWW SSB	SOABHP	VO2GJ (zone2)	W0GJ	Plan
CQWW SSB	SO/SB?	P40R	K4UEE	Firm
CQWW SSB	SO/SB?	VK9LX	VK2ICV	Firm
CQWW SSB	M/S	5H3US	WD8SDL, K8LEE	Firm
CQWW SSB	M/S	C6	K9VV, KB9QQL	Firm
CQWW SSB	M/M	CN8WW	Bavarian Contest Club	Firm
CQWW SSB	M/?	FS/K7ZUM	K7ZUM, KD7BSW, KC7TWZ	Firm
CQWW SSB	M/M	IG9	IQ4A, IR4T, IR2W, II3T	Firm
CQWW SSB	M/M	IH9P	IT9BLB & Intl Team	Firm
CQWW SSB	M/M	J3A	K2KQ, YCCC	Firm
CQWW SSB	M/S	J68J	W4WX & friends	Firm
CQWW SSB	M/?	J6	K3UG, K3LP, K7KL, N3NT	Firm
CQWW SSB	M/M	PJ9B	N3ED +	Firm
CQWW SSB	M/M	VP5T	N2VW, WA2VYA, K2WB	Firm
CQWW SSB	M/S	VP5R	N0KK, N0AT, W5WW, K5PN	Firm
CQWW SSB	M/S	WP2Z	K0XQ, KT0R, UA9AR	Firm
CQWW CW	SOAB/?	6Y5	KN5H	Firm
CQWW CW	SOABHP	8P9Z	K4BAI	Firm
CQWW CW	SOABHP	9M6AAC	K9NW	Firm
CQWW CW	SOABHP	HC8N	HC8N	Firm
CQWW CW	SOABHP	KH2/N2NL	N2NL	Firm
CQWW CW	SOABHP	P40W	W2GD	Firm
CQWW CW	SOAB/?	T32	KR1G	Firm
CQWW CW	SOABHP	WP2Z	WD5N	Firm
CQWW CW	SO/?	ZF2NE	W5ASP	Plan
CQWW CW	SO/?	VY1/N1TX	N1TX	Firm
CQWW CW	M/S	8P	K4BAI, N4TO, K1TO	Firm
CQWW CW	M/S	C6A	N7NU, N7MQ, K7AR, WJ7R	Firm
CQWW CW	M/M	CN8WW	Bavarian Contest Club	Firm
CQWW CW	M/?	H4	K1XM +	Firm
CQWW CW	M/M	J3A	WA1S, YCCC	Firm
CQWW CW	M/S	NH7A	W6QK +	Firm
CQWW CW	M/M	PJ9B	N3ED +	Firm
CQWW CW	M/S	TI5N	K9VV, K6CT, K4UEE +	Firm
CQWW CW	M/S	VU2WAP	N7BG +	Firm
CQWW CW	M/M	YV	Team Vertical K2KW +	Firm
CQWW CW	SB80M	IH9/OL5Y	OK1FUA	Firm
ARRL	10 SO/?	8P	N0JK	Firm
ARRL 160	SO	T32	KR1G	Firm
2000				
CQ 160 CW	SOHP	8P9DX	VA3DX	Firm
ARRL DX CW	SOABHP	8P9JJ	K7BV	Plan
ARRL DX CW	SB/80M	C6AKQ	N4BP	Plan
ARRL DX CW	SB/40M	C6A/K4PG	K4PG	Plan
ARRL DX CW	SB/15M	C6A/W5VBO	W5VBO	Plan
ARRL DX CW	SB/10M	C6A/AA7TT	AA7TT	Plan
ARRL DX SSB	SOABHP	8P	W5AJ	Firm
ARRL DX SSB	SOABHP	FS	W0GJ	Plan
CQ WPX SSB	SOABLP	VP5E	K6HNZ	Firm
CQ WPX SSB	SOABHP	WP2Z	W6XK	Firm
CQ WPX SSB	M/S	8P9JA	K4MA +	Firm
CQ WPX CW	SOABHP	8P	YT6A	Firm
CQ WPX CW	SOABHP	WP2Z	N0KK	Firm
CQWW SSB	SOABHP	WP2Z	K6RO	Firm
CQWW SSB	M/S	8P	K4FJ, K3KG	Firm
CQWW SSB	M/M	GZ7V-Shetld Is	North of Scotland CG	Firm
CQWW SSB	M/M	IH9P	IT9BLB & Intl team	Firm
CQWW SSB	M/M	PJ9B	N3ED +	Firm
CQWW CW	SOABHP	8P9Z	K4BAI	Firm
CQWW CW	SOABHP	WP2Z	WD5N	Firm
CQWW CW	M/M	PJ9B	N3ED +	Firm
ARRL 10	M	8P9Z	K4FJ, K3KG	Firm

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

■

VHF-UHF Contesting!

Jon K. Jones, N0JK
n0jk@hotmail.com

The June 1999 VHF QSO Party—"The E skip was having '807s at the cantina"


N0JK

Conditions were way down this year in the June 1999 VHF QSO Party. I operated single op 6 meters from WB0DRL in EM18 Saturday afternoon and evening. There was some "spotty" E skip to the southwest into Arizona and California. I worked both of the XE2 portables—XE2/NF6L and XE2/N6XQ—with decent signals.

Kent, K6FQ, who operated XE2/NF6L from DM20 had announced the following "schedule" for his version of the June VHF contest:

Friday:

0900: Depart K6FQ's QTH near the border for Mexico
0930: Stop at border, get visa, depart for Ensenada
1200: Meet XE2/N6XQ in Ensenada for lunch
1300: Depart Ensenada for DM20
1800: Arrive DM20
1830: Drink '807s
1900: Assemble station
1930: Drink more '807s
1945: Have dinner at the cantina
2000: Drink a lot more '807s (maybe a few margaritas too)

Saturday:

1100: Start contest, work lots of stations. Correction—work everyone we can hear!
2000: Drink '807s if band is dead...

Kent found some E skip taking a break from the cantina:

"Jon, Thank you for the contact! We had a pipeline into KS most of the contest. Thought we'd work more of you guys, but we're very happy to give many of you a new grid. The place we stayed (we RV camped) was way cool! I'd like to return next year with more power and bigger antennas! Adios!"

I only made around 45 QSOs on 6-meters running a kW and a 6-element Yagi up at 75 feet. I had a brief run of California and Arizona stations, the XE2s and a few ground wave/scatter contacts and that was about it.

W1XE, Pawnee Butte, WY DN80 was very loud into EM18 on 6 meters on both ground wave and scatter the Saturday evening of the contest. The W1XE group posted one of the top 6-meter scores for this year's June contest.

Phil, N0KE, reported, "We were also running about a kW to a pair of 7-element KLMs (on 6 meters). The conditions certainly weren't anything special. We consider ourselves fortunate to have worked 448 QSOs and 175 grids on 6 considering the conditions."

Jay, K0GU found similar conditions one grid square south:
K0GU
DN70
Single Op

Band	*QSOs*	*Points*	*Mults*	*Equipment*
50	406	406	155	TenTec 1208, 700 W, 11 el, 9 el, 7 el
144	60	60	26	FT-847, 1300 W, 4 x 17B2 at 21 feet
222	16	32	11	DEM 222-28, 25 W, 22 el at 60 feet
432	37	74	14	FT-847, 50 W, M^2 28 el at 66 feet
Totals	519	572	206	

Final Score: 117,832

"Six meters was very spotty here. My top hours were 65, 60, 41, 38, 37, 22 and 22. When I got to the rig at 1200Z Sunday morning, scatter was much better than usual. I am not sure how much I missed by not getting on earlier.

This was my first contest with a real antenna on 222. Managed to make a couple of 400-mile contacts on CW with only 25 W. Great band, wish there was more activity...

I didn't make any prearranged skeds. Guess I need to quit sleeping at night and make skeds."

73, Jay K0GU

The W5KFT group, who usually posts one of the top 6-meter scores in the country, found going tough as well:

W5KFT
Operators : KM5FA, N5RZ, K5TR, W5KFT
Category : Limited Multi
Default Exchange: EM00

Band	*Raw QSOs*	*Valid QSOs*	*Points*	*Mults*
50	388	378	378	140
144	148	140	140	32
222	38	36	72	16
432	65	64	128	19
Totals	639	618	718	207

Final Score: 148,626 points.

Equipment

50 MHz
ICOM IC-736
1500 W
7-el at 150 feet
6-el at 25 feet (fixed west)
6/6-el at 18 feet and 38 feet (bottom fixed NE)

144 MHz
ICOM IC-275H
1500W
17-el at 135 feet
18-el at 60 feet

222 MHz
Kenwood TS-850/DEM
350 W
17-el at 40 feet

432 MHz
Yaesu FT-736R
500 W
31-el at 60 feet

"I wish I could tell you that we had great E skip all weekend but as you can see from the above numbers, we did not. We still had lots of fun."

Now to the Numbers

The 20 most worked grids on 6 meters.

1	EM10	24
2	EL29	14
3	EM12	13
4	ELI09	12
5	DM33	12
6	EN34	12
7	EM79	12
8.	EM00	10
9	EM95	9
10	DM13	9
11	EM13	8
12	EM78	8
13	EM85	7
14	DM42	7
15	DM79	7
16	EM11	5
17	EN60	5
18	CM87	5
19	EM73	4
20	EM84	4

W5JAK and KC0BWS operated rover in the western Nebraska, eastern Colorado and southern Wyoming regions during the contest. Jeff sent the following account of their activity:

"W5JAK and I have definitely been bitten. Roving has got to be the greatest invention since sliced bread! We operated 6 meters, 2 meters and 70 cm from five grids—DM79, DN70, DN71, DN80 and DN81—using a brand-spankin' new FT-847 and an assortment of small Yagis. We had a complete IC-706MkII setup for a backup. We learned a tremendous amount (for instance, don't hook up antenna cables at 2 o'clock in the morning, as you might do some really clever things like hook the output of two radios together—not that *we* would ever do such a thing, you understand. Also note that when you put masts in a U-Haul, make sure they can't shift and wedge themselves between the back wall and the lip of the slide-up door (requiring a car jack and 45 minutes to open). We'll definitely be roving again in the next contest, a little wiser and a little more prepared. Our score is embarrassingly low, but we had a blast, and we'll almost certainly do better next time. Hopefully at least ten times better.

The highlight of the trip was stopping in to see the W1XE setup at Pawnee Butte. *Wow*."

Jeff Francis, KC0BWS

6-meter scatter played a larger role in contest scores this year than years past due to the poor E skip. Working 6-meter scatter is different than running stations on E skip. There is an art to using the proper calling technique—and power does make a real difference on what you can work.

Phil, N0KE, contributed the following primer on working 6-meter scatter in contests. These techniques will be very useful in the upcoming September and January VHF Contests.

How to Work 6-Meter Scatter

Phil Kirchbaum, N0KE

The meteor scatter signals you can hear nearly every morning are usually coming from those stations that run serious power. The ones I consistently run across are N5JHV, W7GJ and N7ML. These guys are all running high power and impressive antennas. It isn't easy, but at times I can manage to work them with 100 W and 4-elements. It probably also helps that I've been playing this game for awhile. If they only get a partial copy of my call, they usually know it's me. It may take a few tries but I can usually pull it off.

If you have a "little pistol" station, it is still possible to work these guys on meteor scatter. It helps to wait for a really good rock where their signals are 59+++—and *be quick*. Give their call once, followed by your call and grid. Don't bother saying "*this is*" between the calls—it's just a waste of air-time. If the meteors are in and out I'll give a 10-second transmission where I just repeat the two calls and throw in my grid once in a while.

I'm hoping that I'll hit a meteor and they will at least know someone is calling. Maybe they will get enough information to point their antennas in my direction. Once they know I'm there, I'm making progress, but the battle is long from over—they need to copy my complete call and grid. I'm usually hearing them a lot better than they are hearing me. At this point, since they already know *their* call, I just repeat my call and grid over and over. Eventually I may hit a big enough rock to get the exchange through. Once I'm sure he's got my information correct all I need to do is to "*Roger*" the contact.

A lot can be learned by tape recording your operating and listening to it later. Anyone who does this will probably immediately change some of his or her operating habits.

If you are answering a CQ, just give your own call sign. It's very annoying to hear someone responding to my CQ by giving my call three times—and then fading into oblivion as they give their own call, often without phonetics. It's especially important to use phonetics if you have one or more of the sound-alike letters in your call (B, C, D, E, G, V etc). Please don't get caught up in the bad habit of giving only your last two letters. That is only appropriate for a HF list operation or the March of Dimes Walk-a-Thon on the 2-meter FM band.

Another important point to remember is the ERP difference between you and the super stations. You may hear them perfectly when they are S6, but your signal could very easily be deep in the noise on their end.

During a contest or major meteor shower, there will be lots of signals popping in and out. Write down the calls and grids that you are hearing. You won't always hear the same stations repeatedly as the propagation shifts around. It may take several burns to fill in their complete call and grid. Sometimes a good burn will occur and you may be able to work multiple stations in the same general area. If you've got a few calls and grids written down when this happens, you might already have most of the information and be able to complete several contacts quickly.

Obviously, anything you can do to increase the horsepower on your end will help. 10 W is low power on 6 meters. 100 W is respectable and almost two S-units better than 10 W. 500 W+ is high power on 6 meters. You can work a lot of stations with 10 W—but you can work a whole lot more with 100 W. Additional aluminum is always a good investment.

VHF Activity from HC8

I operated with the HC8N team in the CQ WPX CW last May. I brought and put up a M^2 JHV 6-meter Yagi. I made only one 6-meter QSO during my stay—HP3XUG on June 1st via meteor scatter. The techniques Phil discussed do work. The JHV will stay at HC8 and hopefully will be on the air this fall for 6-meter F2. Trey, N5KO, is taking a 6-meter beacon (donated by VE6XT) to San Cristobal.

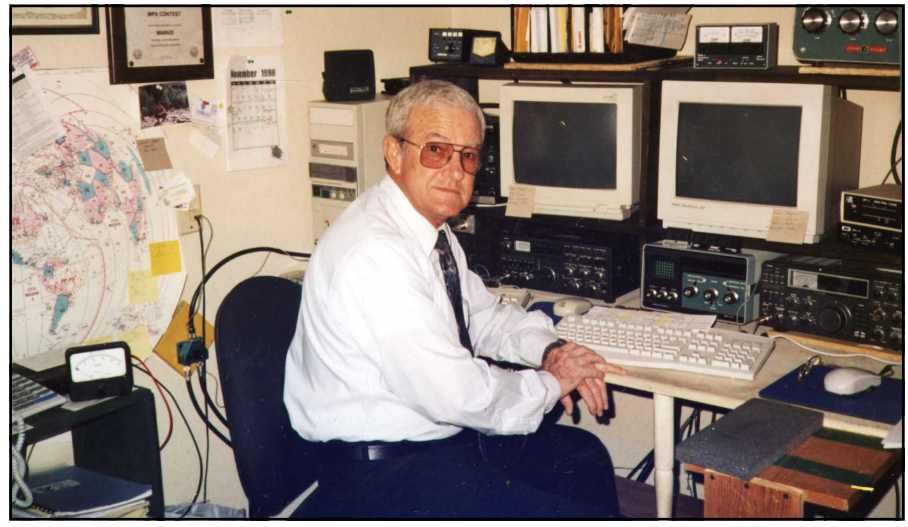
Contest Tip

The Sunspot cycle is coming back. Last year some 6-meter Te contacts were made from Texas and Florida to South America in the September VHF QSO Party. Point to the south Saturday and Sunday afternoon and you may be rewarded with some rare new grids!

Jay Townsend, WS7I
ws7i@ewarg.org

PSK31 Contesting—The New Kid on the Block

Wayne Matlock, K7WM
k7wm@redrivernet.com



Wayne Matlock, K7WM

The PSK31 Rumble

Around four or five months ago, the radio e-mail reflectors began to fill up with a flurry of exchanges concerning a "new" mode—PSK31—developed by Peter Martinez, G3PLX. As the excitement mounted many questions began to be asked. "*What is PSK31?*" *"What is the best method to use?" "How do you hook it up?" "How do you tune signals in?" "What is the best equipment to use?" "Where can you find the free software?" "What are the calling frequencies?" "Can we set a sched?"* All the normal questions any new mode might elicit.

The TROY Amateur Radio Club took the big step and announced the first ever "PSK31 Rumble" contest. It would be a 24-hour fun contest with some unique classes and some even more unique awards. For first place "Super Class"—5 W maximum—the winner would receive a jar of Washington State Famous Cranberry Curd, sponsored by George, N7GC. For first place "Great Class"—20 W maximum—the winner would receive a one pound package of New York State Famous Cheddar Cheese, sponsored by Mr. Bill, NY2U. For first place "Normal Class"—100 W maximum—the prize was a genuine Coontail Rattlesnake Belt Buckle from Arizona State, sponsored by yours truly. Certificates were to be awarded for first, second and third positions in each class, for a US Clean Sweep, and for first, second and third position for Novice entry. The PSK-31 Rumble was scheduled for April 17th, 1999, starting at 0000Z.

Getting Started in PSK31

If you are not familiar with PSK31, all it requires is a sound card equipped computer and a couple of audio cables. For transmit/receive switching you can use your transceiver's VOX circuit. If you prefer to use PTT (push-to-talk), you can build a simple circuit that will allow your computer to key the radio. I already had a sound card installed that I use for listening to Country/Western music while contesting. I use *Writelog/ Rttyrite* for contesting—Wayne, W5XD had already included capabilities for PSK31 in the software. My many junk boxes supplied the necessary cables (Heck—tx/rx audio and PTT—*déjà vu!)* I had to go for it.

I wired the phone patch input and output of my venerable ole Kenwood TS-930s to the sound card output and input on the computer. I switched on the VOX and was on the air.

Warble

I immediately started copying signals on the *Writelog* screen. PSK has a sound all its own. The only way I can describe it is that it sounds like a continuous "warble." On the *Writelog* tuning screen each signal looks like a "M." *Writelog* has a mouse-operated RIT control for PSK; all that is required is to click in the valley of the "M" to tune the signal in. Each PSK31 signal is only 31.5 Hz wide—the *Writelog* receive screen is 500 Hz wide. You can view lots of signals on the screen at one time. You can use your mouse to click on the various signals displayed to see who's who, then use your VFO to tune your transmitter to their frequency. Piece of cake. If you are CQing, you can use your mouse as an RIT control and leave your transmit frequency alone. A second helping of cake.

Contest Action

As the contest started, it became evident someone had taken a couple of large bites out of this cake. PSK31 is very susceptible to noise, particularly lightning. We had a big ion storm going on—tuning was a little difficult. Lonesome Cibola, Arizona has a population of 160 spread out over seven square miles. Man made noise is not a problem. The signals would still come in out of the noise. Once I locked on to them, copy would be good. Even very weak signals would be readable—that's the amazing part of PSK31. It takes a little time to mentally adjust to tuning to perfectly workable signals that are so weak that they barely appear on the tuning indicator.

Tuning very slowly is a must. When perfectly good text copy shows up on the screen—and there's no indication on the S-meter of any signal being there—it's pretty spooky. When the conditions during the contest improved to marginal, the signals on the tuning screen became very defined. It became quite easy to tune signals in. There were long path and short path DX stations that answered my 50 W CQ. Many of these were not even moving the S-meter—yet copy was fine. VK6WR, PY6HL, UT2UZ, JA5EP, SM6BSK, SN7N, HB9AWS and YL2KF were a few of the DX stations on. As usual, I missed lots more. Some of the "Big Gun" contest gurus were also trying their hand at PSK31. K5DJ, K5ZD, N1RCT, VE3WQ, K0BX and others were giving the warble a try. The final results show they finished in normal fashion—either winning or in the Top Ten. A contester is a contester is a contester.

It was also evident this was a high-pressure contest. If you run the audio input level up too high and overdrive,

your PSK31 signal gets excessively wide. This is easy to see on another guy's signal in your tuning indicator. Several contacts were seen with the following exchanges, "*You're to wide*," "*I'll turn it down*," "*I'll stand-by*," "*How does it look now?*," "*Turn it down some more.*" "*How about now?*," "*Looks good, go for it!*," "*Hey hombre, turn the audio down, you got a 500 Hz signal and there ain't any room for the rest of us*," "*You mean to tell me you can actually copy my signal?*" "*I can't believe I'm contesting like this*," "*I can't even hear your signal and I'm copying you, are you sure you're there?*" Too soon it was over and I was just getting the hang of it. All-in-all though, it was a very convincing demonstration of the contesting potential of PSK31. It's a little slower than RTTY and a whole lot slower than SSB or CW—but it sure is fun to operate.

There was much sniveling, whining and complaining about the contest being too short, too new, "*I was just learning how to tune it in*" and various other excuses for not being better prepared (said tongue in cheek). There were also many comments about how much fun it was and "*let's have another one.*" The TARA ARA listened to the plaintive cries and is going to organize one. It's being set up for the month of October (no firm date has been set yet). Consider yourselves forewarned. Get on the air with PSK31. See for yourselves how much fun it is. There are even rumors floating around that some operators are going to make a more serious effort in the next one. Mention of multiple radios, monitors with two PSK-31 screens, double sound cards, audio filtering and new antennas have been heard on the bands.

Check PSK31 Out

One place to find out more about PSK31 is **http://www.megalink.net/~n1rct**. This is an excellent Web site run by Dick, N1RCT. You'll find all the information you'll need to get started. Dick also has the results posted for the first PSK31 Rumble. (He won Normal Class and got the genuine Coontail rattlesnake belt buckle.) There is also a PSK31 e-mail reflector, which I might add is the world's first dedicated PSK31 reflector—**psk@mail.n2ty.org**. To subscribe, send an e-mail with the subject line blank. In the body of message type: **subscribe** <your e-mail address>. Both of these are good sources for obtaining information and hints on operating PSK31. To download some free software go to **http://bipt106.bi.ehu.es/psk31.html**.

As mentioned in this article, along with all its other great features, *Writelog* supports PSK31. It is available from K5DJ at **k5dj@contesting.com** or visit **http://www.contesting.com/writelog/** for more information.

Before the October contest, I am going to add some audio isolation transformers in my input and output lines to reduce the noise and hum. Unfortunately, I wouldn't be able to do anything about the man made noise that's bound to show up in the Fall as the snow-birds start arriving here in lonesome Cibola. See you on the air either diddle'ng, warbl'ng or dit dah'ng.

—Wayne, K7WM

RTTY Contests:

Contest	*Dates*	*Starting Time*	*Ending Time*
CQ/DJ WW RTTY	Sep 25-26	0000Z Saturday	2400Z Sunday
BARTG RTTY Sprint	Oct 9-10	1200Z Saturday	1200Z Sunday
JARTS WW RTTY	Oct 16-17	0000Z Saturday	2400Z Sunday
TARA PSK31?	TBA		

Jay's RTTY Tip

September is the start of contest season and the CQ/DJ WW RTTY test is a good time to check out the propagation and your antenna farm. The weather is still good enough to get up a bit more aluminum for the contest season and with the sunspots climbing rapidly don't forget to check out that 10-meter antenna.—Jay WS7I

Contest Calendar

Compiled by Bruce Horn, WA7BNM
bhorn@hornicopia.com

Here's a list of major contests to help you plan your contesting activity through the end of 1999. The Web version of this calendar is updated more frequently and lists the contests for the entire calendar year and a portion of 2000. It can be found at **http://www.hornucopia.com/contestcal/contestcal.html**.

If you like state QSO parties, October is the month that has two of the most popular—the California QSO party on October 2 and 3, followed by the Pennsylvania QSO Party one week later.

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!

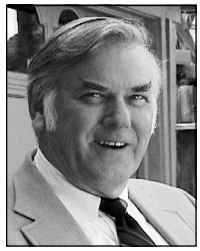
September 1999	
All Asian DX Contest, SSB	0000Z, Sep 4 to 2400Z, Sep 5
CCCC PSK31 Contest	0000Z to 2359Z, Sep 4
IARU Region 1 Field Day, SSB	1500Z, Sep 4 to 1500Z, Sep 5
North American Sprint, CW	**0000Z to 0400Z, Sep 5***
Panama Anniversary Contest	0001Z to 2359Z, Sep 5
MI QRP Club Labor Day CW Sprint	2300Z, Sep 6 to 0300Z, Sep 7
WAE DX Contest, SSB	0000Z, Sep 11 to 2400Z, Sep 12
IRCC Bison Stampeded (Indiana QP)	1800Z, Sep 11 to 0200Z, Sep 12
ARRL September VHF QSO Party	1800Z, Sep 11 to 0300Z, Sep 13
North American Sprint, Phone	**0000Z to 0400Z, Sep 12***
YLRL Howdy Days	1400Z, Sep 17 to 0200Z, Sep 19
Air Force Anniversary QSO Party	0001Z, Sep 18 to 2359Z, Sep 19
ARRL 10 GHz Cumulative Contest	0800 local to 2000 local, Sep 18 and Sep 19
Washington State Salmon Run	1200Z, Sep 18 to 0700Z, Sep 19 and 1200Z to 2400Z, Sep 19
Scandinavian Activity Contest, CW	1200Z, Sep 18 to 1200Z, Sep 19
QCWA QSO Party	1800Z, Sep 18 to 1800Z, Sep 19
Tennessee QSO Party	1800Z, Sep 19 to 0100Z, Sep 20
CQ Worldwide DX Contest, RTTY	0000Z, Sep 25 to 2400Z, Sep 26
Scandinavian Activity Contest, SSB	1200Z, Sep 25 to 1200Z, Sep 26
October 1999	
VK/ZL/Oceania Contest, Phone	1000Z, Oct 2 to 1000Z, Oct 3
EU Autumn Sprint, SSB	1500Z to 1859Z, Oct 2
California QSO Party	1600Z, Oct 2 to 2200Z, Oct 3
RSGB 21/28 MHz Contest, SSB	0700Z to 1900Z, Oct 3
VK/ZL/Oceania Contest, CW	1000Z, Oct 9 to 1000Z, Oct 10
BARTG RTTY Sprint	1200Z, Oct 9 to 1200Z, Oct 10
EU Autumn Sprint, CW	1500Z to 1859Z, Oct 9
Pennsylvania QSO Party	1600Z, Oct 9 to 0500Z, Oct 10 and 1300Z to 2200Z, Oct 10
FISTS Fall Sprint	1700Z to 2100Z, Oct 9
Iberoamericano Contest	2000Z, Oct 9 to 2000Z, Oct 10
10-10 Day Sprint	0001Z to 2400Z, Oct 10
JARTS WW RTTY Contest	0000Z, Oct 16 to 2400Z, Oct 17
Worked All Germany Contest	1500Z, Oct 16 to 1500Z, Oct 17
Asia-Pacific Sprint, CW	0000Z to 0200Z, Oct 17
RSGB 21/28 MHz Contest, CW	0700Z to 1900Z, Oct 17
Rhode Island QSO Party	0001Z, Oct 23 to 2359Z, Oct 24
CQ Worldwide DX Contest, SSB	0000Z, Oct 30 to 2400Z, Oct 31
10-10 Int. Fall Contest, CW	0001Z, Oct 30 to 2400Z, Oct 31
November 1999	
Ukranian DX Contest	1200Z, Nov 6 to 1200Z, Nov 7
ARRL Sweepstakes, CW	2100Z, Nov 6 to 0300Z, Nov 8
High Speed Club CW Contest	0900Z to 1100Z and 1500Z to 1700Z, Nov 7
Japan Int. DX Contest, Phone	2300Z, Nov 12 to 2300Z, Nov 14
WAE DX Contest, RTTY	0000Z, Nov 13 to 2400Z, Nov 14
OK/OM DX Contest, CW	1200Z, Nov 13 to 1200Z, Nov 14
LZ DX Contest, CW	1200Z, Nov 20 to 1200Z, Nov 21
IARU Region 1 160m Contest, CW	1400Z, Nov 20 to 0800Z, Nov 21
ARRL Sweepstakes, SSB	2100Z, Nov 20 to 0300Z, Nov 22
RSGB 1.8 MHz Contest, CW	2100Z, Nov 20 to 0100Z, Nov 21
CQ Worldwide DX Contest, CW	0000Z, Nov 27 to 2400Z, Nov 28
December 1999	
ARRL 160-Meter Contest	2200Z, Dec 3 to 1600Z, Dec 5
TARA RTTY Sprint	1800Z, Dec 4 to 0200Z, Dec 5
ARRL 10-Meter Contest	0000Z, Dec 11 to 2400Z, Dec 12
OK DX RTTY Contest	0000Z to 2400Z, Dec 11
RAC Canada Winter Contest	0000Z to 2359Z, Dec 19
Croatian CW Contest	1400Z, Dec 18 to 1400Z, Dec 19
Stew Perry Topband Challenge	1500Z, Dec 18 to 1500Z, Dec 19
Internet CW Sprint	2300Z, Dec 31 to 0100Z, Jan 1

* Please note that the previously published dates were incorrect. These events will be held on September 5 and September 12 respectively.

International Contests

Joe Staples, W5ASP
w5asp@aol.com

SCC & WRTC2000


W5ASP

No... that's not my latest username and PIN number, but it sure resembles some of the silly combinations one is forced to use these days. But it does represent the Slovenia Contest Club (*SSC*)and their ongoing effort to bring about yet another World Radiosport Team Championship. The last issue of the *NCJ* had a short article on WRTC2000, which will take place coincident with the IARU HF Contest in July of 2000 in Slovenia. With the '99 IARU just past (yeah... Dennis insists we get our stuff in EARLY!) it seems a good time to look a bit further into this truly international contesting event.

Many of you remember the first WRTC that was held in Seattle back in 1990. It was a resounding success and brought a fresh perspective to contesting. Lots of us had a real blast operating, and fondly recall the bewildering quest to discover "who-was-who" among the teams. And what's more, I've still got my green T-shirt, a bit faded but still serviceable.

It took a while, with some false starts, but finally the Bay area gang jumped in and managed to get the second WRTC flanged up and on the air in July '96. Again it was an outstanding event due to superb efforts by the organizers, the participants and the entire support group. (I was all set to do my bit as a referee but got sidelined by illness and had to bow out...something I really regret.)

It was during this occasion that the SCC first stepped onto center stage. Not only did they send the largest foreign delegation to the event, but they also followed up with a strong bid to host the next WRTC—and they got it. (Interestingly enough there were no S5s at the time of the first WRTC. Slovenia did not attain independent status until June of 1991.) Ever since then there has been an ongoing effort by the SCC to make what is now known as WRTC2000 happen.

The SCC's Organizing Committee has committed itself to keeping the international contest community well informed of its plans and progress. The two "communiqués" covered in last months *NCJ* article dealing with the allocation of teams and the time schedule of events are an illustration of this effort.

1998 CQ-M International DX Contest

Continental Winners
Single operator - Multi-band

	CW	*SSB*	*Mixed*	*Score*
AA3B	82720	-	K2PS	150612
W4AU	46272	-	VE6JO	40645
KM5G	33264	-	XE1VV	2442

Multi operator - Multi-band	KT0R	33075 points
Single operator - 7 MHz - CW	XE1RGL	684 points
Single operator - 14 MHz - CW	WA8RCN	1296 points

Scores

Call	*Class*	*Score*	*QSOs*	*Points*	*Mult*
Canada					
VE6JO	SOMB-MIX	40645	357	739	55
Mexico					
XE1RGL	SO-7-CW	684	24	57	12
XE1VV	SOMB-MIX	2442	43	111	22
USA					
AA3B	SOMB-CW	82720	320	880	94
W4AU	SOMB-CW	46272	253	723	64
KM5G	SOMB-CW	33264	234	594	56
WD4AHZ	SOMB-CW	3105	48	115	27
WA8RCN	SO-14-CW	1296	48	144	9
K2PS	SOMB-MIX	150612	419	1141	132
KF6HAN	SOMB-MIX	240	10	30	8
KT0R	MOMB	33075	417	675	49

1999 All Asian DX - CW

*Claimed Scores**

Call	*Pwr*	*Pts*	*Mults*	*Score*
SO/AB				
W7GG	HP	747	283	211,401
K3ZO	HP	777	268	208,236
K3WW	HP	600	203	121,800
WN6K	LP	512	203	103,936
K1KI	HP	513	202	103,626
K5HP	HP	414	175	72,450
K0OU	HP	345	166	57,270
K9DX	HP	256	145	38,425
N6RT	LP	205	123	25,215
N4BP	HP	151	79	11,929
WO4O	LP	117	76	8,892
W4ZW	HP	66	56	3,696
WO9S	QRP	60	41	2,460
SO/SB/15				
K6III	HP	224	106	23,744
SO/SB/80				
N6RO	HP	105	40	8,610

* As posted on the 3830 Reflector by Michael Dinkelman, N7WA

Upcoming International Contests

All Asian DX Contest	04-Sep-99
Panama Anniversary Contest	05-Sep-99
WAEDC European DX Contest, Phone	11-Sep-99
Scandinavian Activity Contest, CW	18-Sep-99
Scandinavian Activity Contest, Phone	25-Sep-99
VK/ZL Contest, Phone	02-Oct-99
RGSB 21/28 MHz Contest, Phone	03-Oct-99
VK/ZL Contest, CW	09-Oct-99
Worked All Germany Contest	16-Oct-99
RGSB 21/28 MHz Contest, CW	17-Oct-99
Ukrainian DX Contest	06-Nov-99
Japan Intl DX Contest, Phone	06-Nov-99
OK/OM DX Contest	13-Nov-99
LZ Bulgarian DX Contest	20-Nov-99
IARU 160 M Contest, CW	20-Nov-99
RGSB 1.8 MHz Contest, CW	20-Nov-99

Note: With few exceptions logs and summary sheets must be postmarked within 30 days of the contest.

Many of us first saw them as they came across the Contest Reflector. They have an active Web site at **http://wrtc2000.bit.si** and an e-mail address of **scc@bit.si**. As the time of the event draws closer, you can bet that there will be an ever-increasing flow of information from these guys. It ought to be fun to follow. How often do we get to see such a unique contest event come about, especially when it's centered in a part of the world we know very little about.

Recently a major focus has been the topic of national team selection. The names of the nine US contest clubs who will each form one of the teams have just been announced. For those interested they are Florida CG, FRC, Mad River, North Coast, NCCC, PVRC, Soc. Midwest, SCCC and YCCC. Those of you who are members of one of these groups should be privy to some interesting dialog at the upcoming club meetings. There are also three wild card teams. There's lots of room for those with the "Right Stuff."

So what's in it for the rest of us? Well, if you're any kind of contester at all, you'll be well advised to keep on top of what is happening, and to make your plans and preparations to get the maximum enjoyment out of the event when the time comes. Don't miss the opportunity to hone your operating skills in the various international contests paying special attention to the time, frequency and propagation characteristics of the very active S5 contingent. The effort may reward you well during WRTC2000. If you're an even more serious player, speak up. Every team leader will have to select a non-club partner. And maybe, just maybe, the summer of '00 might be the time to schedule that long awaited trip to Europe. Apparently Ljubljana, Slovenia is closer to London than Chicago is to Boston and cannot be too hard to find.

On another subject... Terry, VE7TLL, pointed out to me that Pat, VE7QCR, on Queen Charlotte Island had been accidentally omitted from the 1998 IOTA scores given in the last issue. VE7QCR with a total of 505,505 points was the top scoring North American station in the Island Single Operator SSB 24 hour category, quite an accomplishment for a first time contester operating from a west coast island!

1998 LZ DX CW CONTEST

	Class	*QSO*	*Pts*	*Mult*	*Score*
USA					
K4BAI	A	306	979	39	38181
K3ZO	A	48	190	13	2470
K3WWP	A	26	96	11	1056 (QRP)
AA1SU	A	4	12	4	48
N4AF	B14	100	333	11	3663
W1FJ	B14	27	82	8	656
CANADA					
VE3QAA	A	301	1051	45	47295

1998 RAC Canada Day

SO/AB Hi Power

Call	*Band*	*Score*	*CDN Q*	*RAC Q*	*DX Q*	*Mults*	*Total Qs*
VE2ZP (#1)	A	695856	534	34	182	109	750
N6RO (#2)	A	694694	642	43	132	91	817
K4LTA (#6)	A	214776	297	28	119	57	444
N4GU	A	28160				20	144
K4EF	A	26772	90	13	2	23	105
KO7X	A	13110	67	6	46	15	119
W2EZ	A	12784	54	8	26	17	88
W4RA	A	12160	58	9	0	16	67

SO/AB Low Power

K7TG	A	57840	123	14	38	40	175
K4UK	A	52400	115	6	5	40	120
W4YE	A	43384	138	8	55	29	192
WA3HAE	A	42900	97	14	25	33	136
W7YS	A	38012	83	14	4	34	101
KI0MB	A	18538	72	6	33	23	111
K8GT	A	15456	20	11	6	23	37
N2CU	A	14934	64	6	38	19	102
N5KB	A	10108	44	5	0	19	44
W3SOH/1	A	9880	45	7	0	19	45
K0NI	A	9376	48	4	33	17	81
W2LRO	A	9108	35	2	3	23	40
W9BZP	A	4510	31	5	0	11	36
N2JTX	A	3744	18	5	4	13	27
WA2LBT	A	2032	20	1	8	8	29
KA7FEF	A	1120	10	2	0	8	12

SO/QRP

K3WWP	A	8192	36	6	16	16	58
K8UCL	A	7560	34	7	12	15	53
K4GEL	A	5330	36	5	0	13	36
W3MWY	A	2168	21	3	3	8	27
N0QT	A	1652	19	3	8	7	27

SO/SB

W7DRA	3.5	320	8	0	0	4	8
K1IXP	14	7172	50	7	6	11	63
K9DIY	14	1890	15	6	0	9	15
K0LWV	14	870	14	2	7	5	21
N4MM	14	780	10	2	0	6	10
W8RTU	14	550	8	3	0	5	8
N8TI	14	216	3	1	2	4	6

1998 RAC Winter Contest

SO/AB Hi Power

Callsign	*Score*	*CDN Qs*	*RAC Qs*	*DX Qs*	*Mults*	*Total Qs*
N0AC (at N0NI)	681884	524	38	479	98	1041
N5DO	497340	430	36	253	90	719
W7WW	123582	243	13	92	43	348
KD3GC	121878	159	12	84	61	255
W6TK	56232	125	10	56	36	191
XE1VV	38064	70	10	38	39	118
N3BNA	35100	68	11		39	79
W2EZ	31088	74	10	66	29	150
W9BZP	26432	76	9	2	28	87
K0NI	17898	75	4	56	19	135
K4BAI	8640	41	3	35	16	79
KC0COP	1738	12	1	9	11	22
CT1CLR	1660	13	1	8	10	22

SO Low Power

WA3HAE	361200	327	33	185	84	545
KA6BIM	241364	226	20	124	83	370
N2CU	155868	180	18	177	62	375
K8ED	149520	187	24	71	60	282
KQ6ES	111834	150	16	71	57	237
W5GCX	83376	122	16	2	54	140
W4LC	56840	166	10	50	29	226
K4UK	52800	81	13	15	48	109
N6RT	36204	65	9	16	42	90
WA3GNW	24820	53	10		34	63
AA8VG	22032	72	4	8	27	84
N2JTX	11880	40	6	10	22	56
KF9JFG	11640	57	6	140	12	203
K0MLH	11376	37	5	2	24	44
K6MCP	9152	46	2	36	16	84
N0MSB	8588	29	7	11	19	47
WY7S	7600	34	2		20	36
W2LRO	5096	32	3	6	13	41

SO/QRP

NA3V	39760	90	9	28	35	127
K1QM	27472	60	7	34	34	101
W5VBO	27384	76	8	29	28	113
K8UCL	19392	61	8	19	24	88
K5ZTY	18528	51	9	41	24	101
N2NO	17600	52	7	22	25	81
AF9J	10992	31	7	4	24	42
K4GEL	10070	41	6		19	47
N2VPK	3752	21	2	9	14	32
N8XA	3240	27	2	7	10	36
N9PVZ	800	8	1		8	9
XE1HKR	540	6	1	5	6	12

MO

W5WMU	581940	471	27	608	90	106
K9HD	260130	304	26	105	69	435

SO/SB

Callsign	*Band*	*Score*	*CDN Qs*	*RAC Qs*	*DX Qs*	*Mults*	*Total Qs*
ZF2NT	28	100832	246	9	872	23	1127
NA2AA	28	4700	31	5	30	10	66
KB0WHY	28	3600	23	6	5	10	34
KC5ZJA	28	3036	16	4	18	11	38
N4MM	28	1854	17	1	8	9	26
WB0IWG/3	28	1632	18	4	6	6	28
WP4LNY	28	1476	13	1	48	6	62
N9VOK	28	492	6	1	1	6	8
K3JHT	28	156	3	1	1	3	5
KB1CRH	28	114	3	0	4	3	7
N7DR	21	19656	71	6	53	21	130
K0LWV	14	4212	37	3	19	9	59
VA3QSL/W7	14	3088	33	2	8	8	43
N8LIQ	14	2628	21	3	11	9	35
W4RA	14	1530	15	1	0	9	16

■

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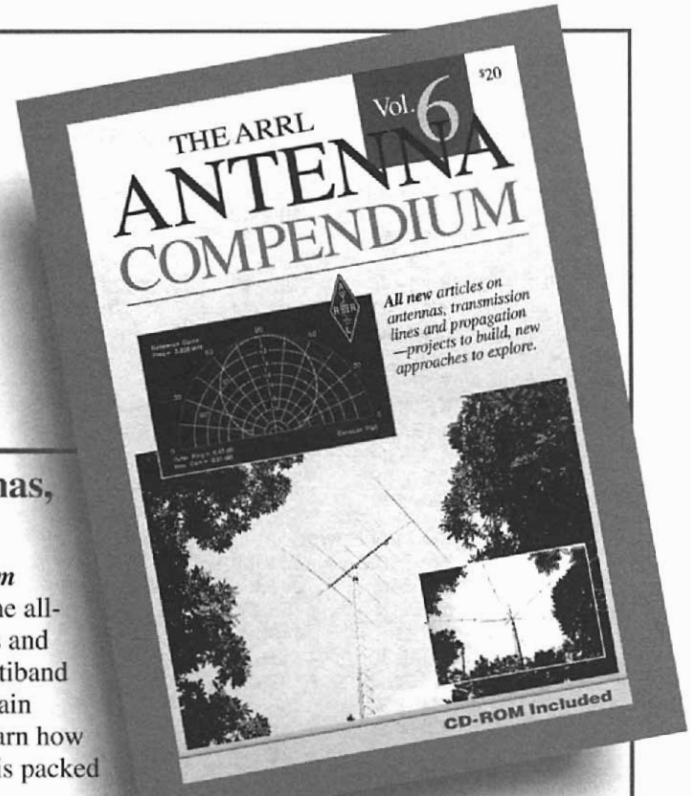

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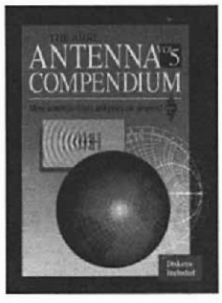

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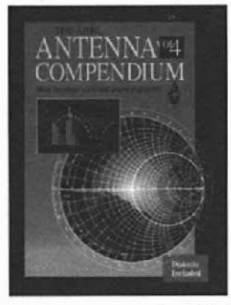

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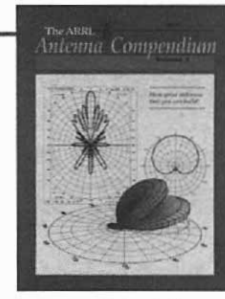

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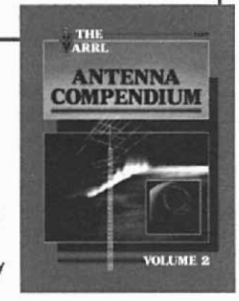

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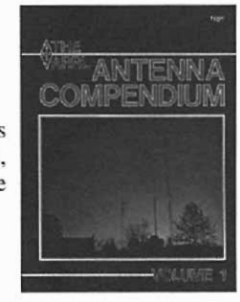

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- *ARRL VHF QSO Parties*
- *ARRL Sweepstakes*
- *ARRL Field Day*
- *ARRL 10-Meter Contest*
- *ARRL 160-Meter Contest*
- *WAE European DX Contest (Europe & DX)*
- *CQ WW DX Contest*
- *CQ WPX Contests*
- *CQ 160-Meter Contests*
- *JARL All Asia Contest (Asia & DX)*
- *IARU HF Championship*
- *California QSO Party*

CT Version 9 continues the tradition of cutting-edge, innovative leadership with a host of exciting new features that makes contesting (and winning) easier than ever: 50-line display mode, color coded band map, window position and color control, mouse support, sunrise/sunset tables, band switch support, Variable CW spacing, increased CW speed range, beam headings, rotor control for the Yaesu G-1000 SDX, and more!

Ordering Information:

⇒ CT Version 9 (for 386/486 computers only)	79.95	_____
⇒ Upgrade from CT 8 to CT 9	44.95	_____
⇒ CT Version 8 (for XT/AT/386/486 computers)	69.95	_____

Shipping:
⇒ $5.00 US, $6.00 Canada, $10.00 DX _____

Total _____

Disk Size: **CT 9** is available only in 3.5" HD format (1.44MB)
CT 8 is available only in 3.5" HD

MasterCard/Visa accepted; checks must be in US$ and drawn on a US bank, payable to *K1EA Software*

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Reputation. It builds every day with TEN-TEC. Thirty years of refining our craft delivers top-of-the-line amateur gear and unparalleled service after the sale. TEN-TEC owners made our reputation what it is today. Ask an Omni-VI *Plus* owner about the quality of our gear and the advice we offer, and they'll tell you - *No one does it better.*

Performance of the Omni-VI *Plus* is unmatched by anyone. We've taken the best qualities of the original Omni-VI and added even more Digital Signal Processing technology. You'll hear signals that no other receiver does, under the worst of band conditions.

"With both of my rigs hooked up to a switch, I was able to switch between the (brand X) and Omni-VI Plus for comparison. Folks, this Omni-VI Plus is the hottest rig I've EVER owned."
- Bill Sawders, K7ZM

"Ten-Tec has really outdone itself with the receiver."
- Howard Eskridge, K9GYI

"We have consistently found it possible to copy weak signals on both SSB and CW with the Omni that gave us trouble with the ___."
- Paul Helbert, WV3J

How do we achieve results like this? Every competitor uses synthesizers that add unwanted noise to the receiver's noise floor. This phase noise causes the noise floor to temporarily increase in the presence of nearby strong signals. Weak signals inside your passband become inaudible. With the Omni-VI *Plus*, you hear the weak ones under the worst of band conditions.

"The Omni-VI Plus has given me new confidence in attacking pile-ups, and in responding to those weak calls I would have passed by before." - Pete Inskeep, NO2D

"I would not have bought it if I didn't think it was the best in the world. The receiver has to be heard to be believed!"
- Alfred Lorona, W6WQC

Superior receive selectivity eliminates the strongest interference from even the closest signals. You select the optimum amount of filtering for differing band conditions. Up to 4 choices of bandwidth in the 6.3 MHz I-F and 3 choices in the 9 MHz I-F. Two of the 7 filters are standard; add only the options that fit your operating style.

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"I can't believe how well I heard in the 160 contest!"
- Wayne Hudson, K5ZG

"If I had to buy a new radio tomorrow with no money limit, I would buy the same radio again." - Bob Miller, N9MU

Omni-VI *Plus* incorporates DSP technology to enhance your ability to pull out the weak ones. Single-button DSP NOISE REDUCTION provides up to 15 dB of in-passband random noise attenuation. Tailorable DSP LOW PASS filtering cuts fatiguing high-end audio hiss. DSP AUTO NOTCH instantly eliminates interfering carriers - work 40 meters day or night! DSP-generated CW transmit offset is front-panel adjustable 400 - 990 Hz with auto-tracking sidetone.

"When I hit the NR (noise reduction) button, signals jumped out of the noise. I am convinced I have the best radio in the world."
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"How is it? In a word...AMAZING!" - David Hammond, N1LQ

Quality and reliability are synonymous with TEN-TEC. Rigorous computer-controlled tests exercise every Omni-VI *Plus*. Made possible by the rig's high-speed PC interface coupled to automatic test equipment. Our own custom software orchestrates the entire process. There's also an overnight burn-in. Each Omni transmits into a dummy load, cycling between TX and RX every few seconds, changing bands along the way. One final performance check finishes it up. Backed by a one-year warranty and TEN-TEC's legendary service.

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- Rob Komtes, WS7U

"The rig is wonderful to use, the controls are in the right place, every control makes sense, and the rig truly does 'dig out the weak ones.' Congratulations on a great transceiver."
- Terry Ussher, VE3AWE

"Finally, a radio built like my Hewlett-Packard® test equipment. I absolutely love it. Sorry I didn't purchase Ten-Tec 10 years ago."
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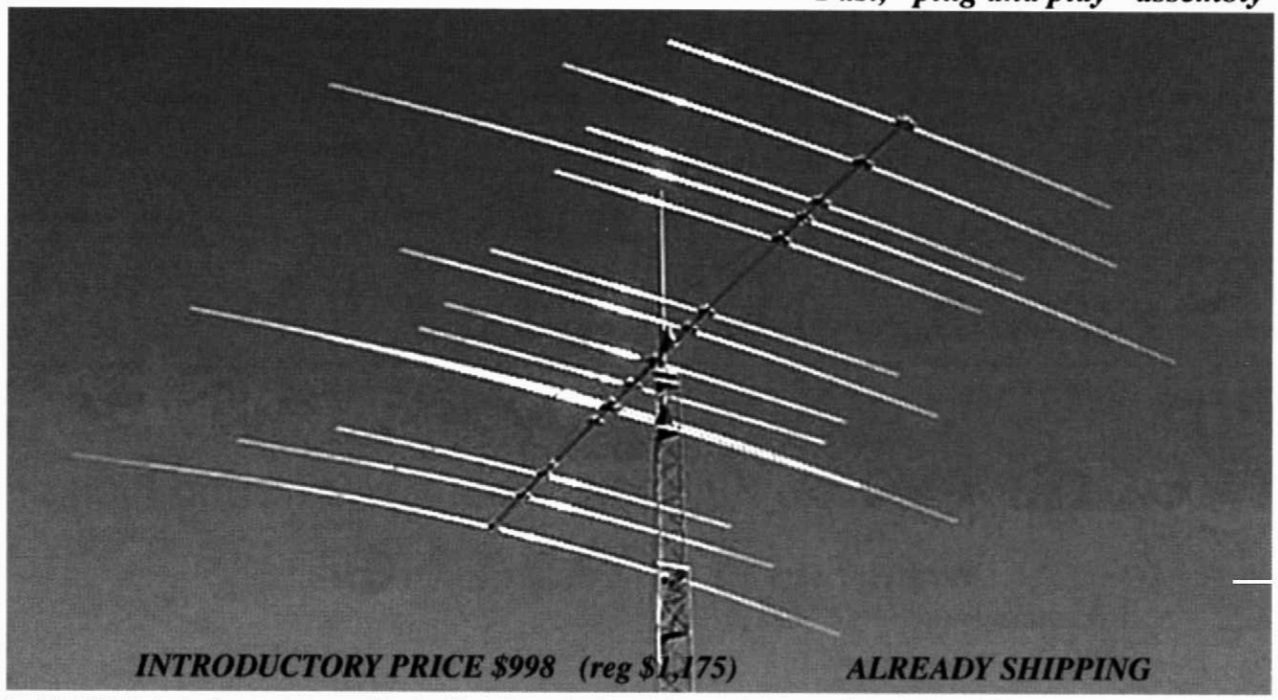

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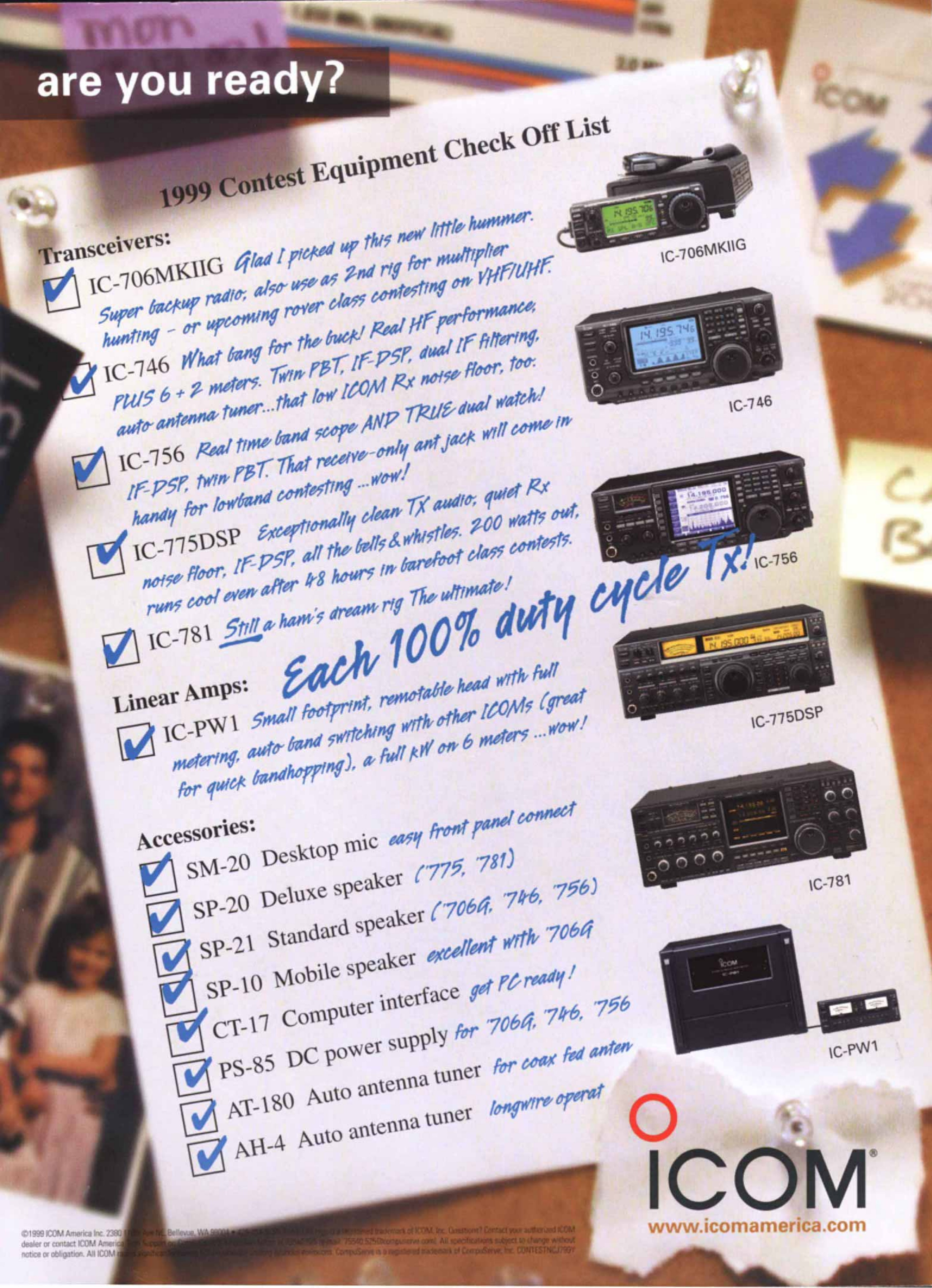

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Transceivers:
IC-706MKIIG Glad I picked up this new little hummer. Super backup radio; also use as 2nd rig for multiplier hunting - or upcoming rover class contesting on VHF/UHF.
IC-746 What bang for the buck! Real HF performance, PLUS 6 + 2 meters. Twin PBT, IF-DSP, dual IF filtering, auto antenna tuner...that low ICOM Rx noise floor, too.
IC-756 Real time band scope AND TRUE dual watch! IF-DSP, twin PBT. That receive-only ant jack will come in handy for lowband contesting ...wow!
IC-775DSP Exceptionally clean TX audio; quiet Rx noise floor, IF-DSP, all the bells & whistles. 200 watts out, runs cool even after 48 hours in barefoot class contests.
IC-781 Still a ham's dream rig The ultimate!
Each 100% duty cycle Tx!
Linear Amps:
IC-PW1 Small footprint, remotable head with full metering, auto band switching with other ICOMs (great for quick bandhopping), a full kW on 6 meters ...wow!
Accessories:
SM-20 Desktop mic easy front panel connect
SP-20 Deluxe speaker ('775, '781)
SP-21 Standard speaker ('706G, '746, '756)
SP-10 Mobile speaker excellent with '706G
CT-17 Computer interface get PC ready!
PS-85 DC power supply for '706G, '746, '756
AT-180 Auto antenna tuner for coax fed anten
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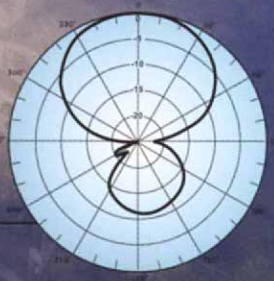

High Front To Back Ratio On 10/15/20m

MA5B SPECIFICATIONS						
FREQUENCY	10	12	15	17	20	Meters
ELEMENTS	2	1	2	1	2	per band
GAIN						
FRONT TO BACK RATIO						
SIDELOBE ATTENUATION						
VSWR 2:1 BANDWIDTH	665	>110	255	>100	90	kHz
LONGEST ELEMENT	17.1ft (5.2m)					
TURNING RADIUS	8.8ft (2.7m)					
BOOM LENGTH	7.3ft (2.2m)					
BOOM DIAMETER	1.5in (3.8cm)					
MAX. WIND SURFACE AREA	3.22 ft² (.3m²)					
MAX. POWER HANDLING	1.2 kw					
WEIGHT	26.5 lbs. (12 kg)					

For more information on this outstanding HF Multiband Beam Antenna, visit our web site at **http://www.cushcraft.com** or contact any one of our dealers worldwide.

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