



Potomac Valley Radio Club Newsletter

January 2004

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PVRC welcomes Dan O'Leary, KG4ECI; Chris Plumblee, KG4CZU; and John Kippe, N0KTY, all new members of the newly-formed PVRCNC-West Chapter

Lots of contests in January -- check out the new Contest Calendar on page 10

Editor's Note

By Pete Smith, N4ZR

You'll note that the Reference Pages have gone AWOL this month. That's because I've long been dissatisfied with both the format and the content. We're working on a ground-up revision, but in the meantime Howie, N4AF, is carrying updated reference pages on the PVRC web site at <http://www.pvrc.org/reference.htm>. From now on, that will be the point of reference for the printed version, so please let him know about any factual changes that are needed, and he'll post the latest and most accurate information.

From the President by Jack Hammett, K4VV

Congratulations to you who are intense in your contest activity, making this season an exciting one. Many more contest opportunities are imminent. Our new and "recharged" members are providing a surge of activity. The 5 Million Awards Program continues to recognize achievements of our members.

Special recognition is due to our recent 50 Million Endorsement winners: W4MYA, K3ZO, and K3MM, and to the 25 Million Endorsement winners: K4ZW, K1HTV, and N4RV. N4CW, N4ZR, and ND3F won ARRL Gavels. See the Holiday Dinner Minutes for the full details of those recognized in the 2003 awards. Special thanks to Chris Imlay, W3KD, our speaker.

Dallas, W3PP, provided information on the reflector about the need for equipment to help J. Allen, VY1JA recover his station to reliable operation. There has been a considerable response of members offering serviceable equipment and others to contribute to shipping. There are several potential contesters in the VY1JA community, and we are prepared to collect the equipment to pack and ship to J. to give a real boost to those who put it to good use. We need a volunteer to lead this effort, to follow up with those willing to contribute, decide on what to send, coordinate the staging and shipping of the gear to VY1JA. PVRC will support this effort to supplement the individual contributions. Contact me or Dallas.

As I write this on December 22, we have just been alerted that the terrorist threat level has been raised to High. That reality helps us reflect on the great contributions and sacrifice that our military service members and all who support them are making for the nation. Eric Hall, K9GY is one PVRC member who is serving on active duty to support the current campaign. Others are involved. A related thought is that our members are well equipped with stations and operating skills to provide public service and emergency communications to our neighbors and our nation during troubled times.

Contesting as the Solar Indices Plummet (Part V)

by Fred Laun, K3ZO

Last month I promised that in this segment I would discuss how interesting major geomagnetic storms can be for propagation junkies like me. I have now observed quite a number of them over the years, enough to have learned that there are propagation patterns that can reliably be predicted to occur any time a major storm takes place.

Just prior to a major geomagnetic storm, conditions are usually quite good. Often there will be several consecutive three-hour reporting periods where the K index remains $K = \text{Zero}$.

This is what I call "the calm before the storm". It happens in various forms in nature. There is the eerie calm just before a strong thunderstorm hits. There is the quiet period before a hurricane arrives (which incidentally can be a good time to work long-distance tropo on VHF - I recall working several stations in Florida on 2 meters just prior to one hurricane's passage up off the East coast.) There is the drawing back of the ocean water away from the beach just before an earthquake-generated tsunami hits.

In the case of the Sun we still have a lot to learn yet about the solar wind and the way it flows, but I believe we will ultimately be able to predict major solar storms with much greater accuracy and lead time than we can today by applying aspects of fluid theory to the segment of space contained within our solar system.

A geomagnetic storm will often be preceded by an ionospheric blackout (SID) 48 or so hours ahead of it. After the blackout, the bands will return to normal within an hour or so, and stay that way until the storm hits. DXers on relatively quiet bands such as 10 and 15 meters will often notice long bursts of white noise marking waves of intensity of the solar wind.

At the beginning of a major geomagnetic storm there is strong aurora propagation on six and two meters, and even 222 MHz and 432 MHz can get into the act. Under such VHF conditions you can point your beam straight north and leave it, but experienced VHFers have learned that to get maximum results out of an aurora you are continuously moving the beam around to peak up signals you are hearing. Your optimal beam heading to a particular station depends to some extent on where he is beaming. As either he or you change the orientation of your beams, you reflect signals from a different part of the aurora curtain.

However, in general it can be said that the best heading for maximum signal strength in an aurora is north-northeast at the beginning, and the optimal heading gradually moves further west as the geomagnetic storm continues. At the midpoint of a major storm you have two options; you can beam generally straight north and work W8s/W9s/VE3s, or you can beam further to the west, often as far as 315 or 330 degrees, and work W4s in GA, NC, SC and TN, W5s and W0s. Many VHFers have yet to realize that this is the case and often I find myself with a clean shot at a W5 or W0 even while the band is loaded with aurora signals. You can tell where other east coast stations are beaming by where their signals peak up. When beaming north you will hear one set of loud W1/W2/W3 signals, and then when you point at 330 degrees a completely different group of W1/W2/W3 signals will become prominent.

Because of the way the auroral oval wraps around the Northern Geomagnetic Pole, it is more common for an aurora to take place any time of day from mid-afternoon through early evening than at other times of the day. Only during very severe geomagnetic storms -- the kind that occur only a dozen times in a ten-year period -- will an aurora last all day long. For this reason one can often predict the existence of auroral propagation here by observing on DX Summit that European stations are enjoying aurora propagation during their late afternoon/early evening.

Meanwhile the geomagnetic storm is having an effect on the HF bands also. The effect on ten meters is actually quite similar to that on six meters, and you can have aurora-reflected QSOs on 10 also, though the tone is not as harsh and hissy as it is on the VHF bands. At the beginning of a solar storm, before the path to Europe is shut down by the aurora, you will notice strong backscatter with an aurora screech on the signals of DXers working Europeans on 15, 20 and 40 meters.

At the same time signals on 160 from Southern Europe often become quite strong just as the storm starts, but the signals will be skewed slightly to the south of true path. I recall once breaking into a round-table of Italians on 160 meter SSB under such conditions and completely surprising them. I don't speak Italian but I speak Spanish fluently and was able to ascertain that the handle of one member of the group was Luigi, so when one fellow let his VOX drop I yelled: "Hey Luigi" and the surprising QSO began.

Signals to the South are enhanced on all MW and HF bands during most of a solar storm. Even on the standard AM broad-

cast band, in the evening hours during a solar storm, South American and Caribbean stations predominate on non-local channels. You can tell that this is the case when you tune across the broadcast band because you will hear lots of heterodynes due to the offsets of the Latin American BC stations from the center frequency of each channel. Most government authorities in that part of the world are much less demanding than the FCC about the frequency tolerance that their BC stations are required to maintain, and an offset of several hundred Hertz is not uncommon.

Also on the standard AM broadcast band, at the beginning of a geomagnetic storm, during the evening hours, signals on the high end of the band from out of the area will exhibit rapid flutter, while later on in the storm semi-local stations which are normally obliterated by out-of-town signals during hours of darkness will be heard. For example, let's take the frequency 1560 KHz. During the evening hours around here the station which normally dominates that channel is WQEW Radio Disney in New York. At the beginning of a geomagnetic storm, during hours of darkness WQEW, whose night time antenna pattern sprays most of its RF toward the aurora curtain, will be heard with a strong aurora flutter. Later on in the storm during hours of darkness, WQEW will be largely replaced by a small station in La Plata, MD which is normally wiped out by WQEW, along with heterodynes from offset Latin Americans.

On 75/80 meters if you tune to the segment between 3650 and 3750 you will hear lots of the round-tables of LU stations who use that part of the band in a very similar fashion to the way we use the 75 meter band here.

Under such conditions I often search through our 40 meter phone band and find local QSOs going on in South America which would normally be way down below the signal level of the local QSOs taking place around here. Though we often feel that the only way to work DX on 40 meter phone is to work split, in point of fact many South Americans retreat from the bottom 100 KHz of the band to the part that we use in order to have local ragchews without being bothered by DXers or nets. Since I speak Spanish, during geomagnetic storms I usually find several such QSOs going on between 7150 and 7250, and with the magic word "permiso", which means the same as when we say "break" in such circumstances, I am welcomed into the roundtable by often very surprised hams in Chile or Argentina, who had no idea their local QSO would be monitored all the way up here. It is not uncommon in such circumstances to be told: "You are my first ever QSO with the United States."

Conditions on 20, 15 and 10 will likewise yield strong signals from South Americans at times like this.

Six meters is worth discussing as a special case. At the beginning of the geomagnetic storm, as I have already said, you will have strong aurora on six meters. The beam heading is not as sharp as it is on two meters or the higher bands, and one northerly heading will be sufficient for any number of QSOs all over the Eastern half of the country. As the aurora propagation continues, it will often be accompanied by what is known as "auroral E" propagation; that is, portions of the ionosphere's E layer will be energized to reflect "short skip" signals just as if we were dealing with a summer "Sporadic E" opening. The difference is that "auroral E" most often occurs late at night, or sometimes even in the wee hours of the morning. I can recall once during a VHF contest when Dave, K1RZ, stole a march on everyone else around here because he was still awake when the band opened up to VE5, VE6 and VE8-land while everybody else was already in bed. Yes, auroral E is most common for stations in the northern tier of U.S. states and in Canada.

Also on six meters I have learned that during really major geomagnetic storms, just after the aurora quits, it pays to turn one's beam south, because it is not uncommon under such conditions to have F-layer propagation to Northern South America and Southern Central America. Frequently this will mean an hour-long or so opening to HK, YV, HP and TI stations, even during geomagnetic storms in low-sunspot years. During daylight hours on the day following the geomagnetic storm, it is also quite common to have six meters open to all of South America. On that day the morning will often bring very strong signals from the Caribbean and Northern South America, while early- and mid-afternoon will bring in moderately strong signals from Brazil, Argentina, Uruguay and Chile.

I hope this month's column has inspired you to look around a little more rather than turning the radio off when you find a major geomagnetic storm in progress. Conditions at such times are certainly different, but they can be fascinating. And remember, you only have a couple dozen opportunities in a lifetime to observe them, so enjoy them and exploit them when you get the chance!

W4MYA – Bob Morris
The story of the man behind the radio
By Jim Nitzberg, WX3B



Introduction

I can remember in 1990, that my idea of a good contest was “pouncing” on about 100 stations during the event, and I could always hear this unusually strong backscatter signal on my G5RV at 20 feet from an unknown station: W4MYA. I always wondered who was behind that signal, and why it was so loud. It would be 9 years before I would get to know Bob, and eventually operate with him.

I am fortunate to have received Bob’s signal, perused it, tracked him down and eventually was invited to operate with his team. With Bob’s encouragement and teaching – contesting has become one of my favorite hobbies within amateur radio.

You’ll have a hard time finding another person with more passion, enthusiasm or excitement for ham radio and contesting. Bob is always generous with his time and information – and he absolutely loves talking about DXing and contesting, radio equipment, propagation, antennas, equipment, etc.

Everyone has a person they credit with encouraging them to get involved with a hobby – and for me, it was definitely my experience with Bob and team W4MYA.

The W4MYA Interview

Jim: What is the earliest age you can remember expressing an interest in radio?

Bob: In 1957, my Dad took me over to George Cunningham’s radio shack (now a silent key) and I witnessed George working Saudi Arabia on SSB!

Jim: Can you tell me about some ‘early’ projects you worked on?

Bob: I Built a Cat’s Whisker – Germanium Diode – AM Receiver. I also built a 2-tube battery powered receiver for the short wave bands – I was about 10 years old.

Jim: When were you originally licensed?

Bob: 1958

Jim: When did you start contesting? Tell me about that experience.

Bob: I started contesting in 1959 – and my first contest was the ARRL Sweepstakes CW contest. I logged 401 QSOs running my DX-20 to a trap dipole at 20 feet. The radio was crystal controlled and transmitted on 3.706Mhz, and I ran 50 watts and used an original Vibroplex Bug, which I still have, today.

The punch line of this story is that the ARRL refused to accept my log because of errors – and my score was disqualified! Well, I only made that mistake once.

Jim: We all have that “one” special person we credit with getting us involved deeply into contesting and Multi-operator events. Who was that – and what station did you operate at?

Bob: Jack, N4RV got me involved by inviting me to operate with Ed and his team at W3AU. Ed (recently a Silent Key) had the best of the best – 6 operating positions, a 7th on 20 meters (two positions) and he had Collins S line radios back then. I operated the night shift and helped Jack during the daytime. The call signs of Ed’s team are quite familiar: W3AZD on 10m, K3EST on 15m, W3TNZ on 40m, K3ZO on 80m, W4IN on 160m. I operated with team W3AU for several contests in the late 1970’s.

Jim: Were there any other stations you guest operated at before building your own station?

Bob: I was a guest operator at KX4S and W4DR

Jim: Describe your multi-operator contest station

Bob: I moved to my current home in Goochland, VA in 1989. On 5 acres of land, we put up tower #1 in 1990 with 80

feet of Rohn 45. On that tower went a 2 element 40, a High-Gain TH-7 tribander and some wires. At this time, I had a small operating room, which has subsequently been transformed into a bunkhouse that can sleep 5 people comfortably.

When I got serious about station building, I put up a large radio room, and over the years installed many towers. My station consists of 11 dedicated operating positions (this means 11 radios, 10 amplifiers!). I can have two operators staffing each band (except 160) when I have enough operators.

I have 7 antenna towers, about 36 transmit antennas, and 8 400 foot Beverage (receive) antennas. For those interested, a detailed rundown of my towers, antennas and operating positions is available in the October, 2003 edition of NCJ.

Jim: Who was instrumental in constructing the towers at W4MYA?

Bob: NK4H and WK4Y were the two people that spent manweeks building the towers and mounting the antennas at W4MYA.

Jim: What is your favorite contest? Why? Do you prefer phone or CW contests?

Bob: The CQ Worked All Prefixes (WPX) contests are my favorite – because everybody can work everybody, and your next-door neighbor could just as easily have a “rare” multiplier as someone halfway around the world. As far as Phone and CW go – I like both modes and I operate both modes in most of the contests. I really don’t have a preference for phone or CW.

Jim: What is the most challenging part of Multi/Multi Contesting?

Bob: Besides keeping the equipment and station in working order – by far the most difficult challenge I’ve had recently is finding enough operators to do a dedicated, full time effort. As the ham and contesting population ages, we need to recruit new hams into our hobby. I have always been open to training new contesters at my station and welcome the opportunity.

Jim: Have you ever been on any DX-Peditions?

Bob: Yes – once: VP2MFM Multi/Two in 1995 ARRL DX SSB. I was invited by the Woodbridge Wireless group and worked mainly the night shift on 80/160, and had a few hours of fun on 10 meters. Our team captured #1 world outside of the USA.

Jim: What is one of the most memorable moments you can remember in your ham radio experience? Do you have a favorite band?

Bob: I’ve been a ham for 45 years – and one of the most memorable moments I can remember was having JY1 call in during one of the contests. WK4Y was the call sign we were using, so it was likely a WPX contest. I didn’t work King Hussein myself, but one of the operators did. My favorite band today is 160 meters – because it represents the most difficult challenge, and I need the most countries on it.

Jim: Who are the other “Major Contributors” you’d like to acknowledge in the station building of W4MYA?

Bob: N4EHJ, W4HZ, W4HJ...and of course...my wife Lilly. Lilly provides all of the food and clean-up for my guests at our Multi/Multi’s, and of course puts up with my disappearing act for 48 hours at a time during the contests.

Jim’s Follow-Up Note: Lilly is actually Bob’s secret weapon to attract new operators for his team. Upon my first visit to W4MYA – After a gourmet meal and as I was running JA’s on 15 meters, Lilly placed a warm brownie and ice cream desert treat in front of me. I was HOOKED! Breakfasts, lunch and dinner are usually home-cooked meals. Even when the bands are dead, the meals are always great! I have also seen Lilly approach Bob during a contest, lean over and hug him for good luck during the event. I asked Lilly what she thinks about contesting, and her response was that she loved having Bob’s friends over, seeing Bob have such a great time, and cooking for the group. No doubt in my mind that this makes it a delight for Bob and his guests!

Jim: About how many QSOs have you logged? How many contests do you enter per year?

Bob: I have 363,000 QSOs dating back to 1960 in my DX4WIN log! Most of them start at 1990, however I did enter some QSOs from QSL cards dating back to 1960. I enter about 15 contests per year, and depending upon operator availability, I like to run 6 contests per year as a Multi Operator/Multi Transmitter entry. These are: ARRL DX, CQWW, and CQ WPX and the Virginia QSO Party. I also have a great time operating field day from home!

Jim: Why did you undertake building a Multi/Multi station?

Bob: Well – there weren’t really any big stations to operate (after the mid-1980’s) at when I began mine. I wanted a place for my friends and I to be able to operate together, and I also wanted a station that could be very competitive, while

at the same time providing opportunities for training new contesters. Seeing and operating at W3AU's station planted that seed!



W3AU Ops -- Then and Now

Top row, left to right: Ray Conrad, KT4W, Carl Kratzer, K3RV, Bob Morris, W4MYA, and Jack Reichert, N4RV

Bottom row: Phil Al-lardyce, KT3Y, Tom Abernethy, W3TOM, and Bob Cox, K3EST.

Taken at the PVRC Holiday Party 2003.



W3AU Ops in 1972 -- those pictured above are in boldface:

Top - K2SS, W3AU, N4RV, WA3AMH, N4IN, K3RV, K5BSZ

Bottom - KT4W, K3EST, W2KA, KC1F

The Toolbox **By Don Daso, K4ZA**

While atop a tower recently (for an un-named client), I had reached the final phase of work, of aligning the beam with “true North.” I was surprised when the station owner said he would have to go in the house & retrieve a compass. I rely on the station owner to tell me what he/she wants, of course, but may I suggest the following as a simple solution? Find the azimuth for ONE of your existing guy wires. Then, it’s a simple matter to set the rotator on that setting, turn the beam so it’s aligned (easily visible from the ground, as well as easier for the guy on the tower to see, too), then lock the beam in place. (If you’ve truly *designed* the station, your guy wires will be pointing in known directions anyway, so you can utilize the open space to your best advantage. But having a ready reference to true North is something we should all know.)

At this same location, the owner told me he’d spent some time in the CQ WW listening to me run, while I was opping at W3LPL’s. But his next question surprised me—he wanted to know “how” to Search & Pounce, what my technique was, if there was a secret to it.

Upon reflection, I realized that the glib, *Tune up or down the band, working everything you hear*, answer wasn't what he wanted. Herewith, some thoughts on the process. I believe one of the marks of a truly good operator is to know, quickly, seemingly within seconds, what's going on when he/she arrives on a band. So, when making a shift from running to S&P, it's important NOT to lose time "figuring out," or guessing at what's going on.

Obviously, you may begin tuning anywhere, on any band, but starting at either the top or bottom edge will ultimately save you time when speaking of CW. But for SSB, it's another story. I still encounter operators who tune "incorrectly" using sideband. You will always do better when tuning in the proper direction--into the passband! For USB (on 10-20M), you tune UP the band; for LSB (40-160), you tune DOWN the band. Tuning into the passband means you won't have to "rock the dial" back on frequency as you tune in signals. Some operators seem to tune in chunks (I've encountered other ops tuning with the keyboard, as well as with the up/down keys on the hand mic over the years), but I like to go as smoothly and as slowly as possible. If you find yourself with lots of stations answering your calls immediately, you should obviously be thinking pretty quickly about shifting from S&P to CQing yourself, of course.

With CW, you must be able to tell, just from "the sound," if a guy is DX, if he's new, or not. This means knowing the calls of active contest stations, and being able to USE the check partial feature of your logging software efficiently. (Knowing, without having to rely on the computer, if you've worked, say, HC8N already, is a tremendous asset.) With SSB, it helps if you can recognize accents, too. All the things you learned as a beginning DXer will come into play here: is there flutter on the signal, is there excitement in the voice, is the signal incredibly loud (I often make the first pass, or the final pass, on a band using the SA/CA antenna, as those signals pop out by being so strong), have I found a pileup, and so forth.

In either mode, in CQ WW, listen for the zone number, or an odd power in the ARRL DX Test. Take any QSO you can find, most of the time. Sometimes, when I notice I need a multiplier on a certain band, I will tune with beams in that direction, especially if it's something I may only have one chance of working.

Again, upon reflection, what seemed so obvious at first blush, wasn't, at least to a newly-licensed (less than three years) operator. It was interesting to talk to him about time, how fleeting it is, how a multitude of things can easily slip through the cracks or be forgotten (six QSOs equals a new mult in WW, for instance).

I'm looking forward to seeing his contest scores improve, now that he's got new hardware up in the air. But again, tools don't always have to be mechanical in nature.

What's in your toolbox?

UP TWO—Adventures of a DXpeditioner

A review by Don Daso, K4ZA

By now, you've probably all seen the ads for Roger Western, G3SXW's book *UP TWO*, published earlier this year by Idiom Press. I'd dipped into it at Dayton, then W3DQ mailed me his copy, saying I should review it. It's a quick read, yet worth your time.

As DXers, we learn early on about maps, far-distant locations, other cultures, and perhaps, if we're lucky, some of us even travel a bit ourselves. Roger was fascinated from an early age with foreign things—language, culture, maps, history, and it wasn't long before he was equally taken with radio propagation. Interestingly enough, his career required overseas travel, and it wasn't long before the two became intermingled.

Roger has traveled to 22 countries over the past 35 years, mostly for Multi-Multi contest operations. This book is a collection of stories "about" those trips, with the attendant successes and some follies all thrown in. I say "thrown in" because I, for one, wished the book had been edited better, that some structure or organization was present to bind the stories together. The book suffers from jumping back-and-forth in time, but it's perfect for dipping into at random. It's also worth your time because these M-M efforts often resulted in record scores, along with world-high finishes. So, it's not only interesting to read about the trials and tribulations, it's important information from a "study" point of view, as well.

Having worked Roger dozens of time (along with best pals Nigel, G3TXF, Vince, K5VT, Wayne, N7NG, and others) from several of these places, in countless contests, I'm willing to simply enjoy the stories as presented. And those QSLs look good on the wall, too!

Maybe you got one in your stocking? If so, enjoy the read. New ops can (and should) take to heart the instructions given on "Working a Pileup," which are included in the final chapter.

A Report on the SCAF-1 Audio Filter **by Bert Michaud, N4CW**

I ordered my SCAF-1 kit along with a Logikey K-3 keyer (assembled and tested) on a Wednesday from Idiom Press's web site (www.idiompres.com) and received both the following Friday! Can't beat that with a stick. The cost is \$89.95 for the kit, \$134.95 assembled and tested. Shipping is \$7 to a US address for either one.

The kit was neatly packaged, and the instructions were concise and error-free. They do recommend a magnifier, and I'll back that up; the parts are tiny enough that you'll need some visual aid. I used a headband type with the additional swing-over magnifying lens. For most things, just the headband with its lenses are enough, but when you want to check to see if you're "bridging" a solder point with an adjacent one, the additional lens helps.

Although they don't mention it, let me recommend some "solder wick" that you can get at Radio Shack -- just in case you have to undo a solder connection, like I did! Give yourself two to three eventings (2-3 hours each time) to complete the job. You will be tired after each session, and you don't want to work on tiny stuff when you're tired.

After you've finished, you'll have to wire up the power plug. They provide one...it's a "smidgin" larger than what I use on most other powered devices. The center/plus pin is fatter, too! Also, you're cautioned not to use a "wall wart", so plan on tapping your 13.8VDC supply. There are two output jacks, one requires a mini stereo plug, and the other jack is the RCA type. Since each ham's station is different, you'll have to mate these cables appropriately.

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Initially, I tried the SCAF-1 with my IC-706 MkIIIG on CW. The first thing I noticed when I turned the filter on was that it really quieted the audio down; ambient noise on the speaker and in the headphones is definitely reduced. Then, I turned the "tuning" knob counterclockwise, lowering the cut-off frequency (the SCAF-1 is a low-pass filter with the upper cutoff variable), and tuned in a CW signal. I played around with the cutoff frequency until I was happy with the bandpass. Then I turned the SCAF-1 off; what a difference! Suddenly there were squawks and beeps from nearby stations that the filter had cut off. As you know, the 706 is notorious for having a gradual taper to its bandpass filters, often conferring the name "blowby" to the result. The SCAF-1 effectively keeps you from hearing that phenomenon, making copy much less tiring.

How's it perform on SSB? Well, I used the SCAF-1 with my MP during SS Phone...it helped a lot on crowded bands. Plus, it improved the ambient noise level on the MP also! So I compared the SCAF-1 with my Timewave DSP-59+. The DSP has several more features and is more flexible than the SCAF-1. Using "Spectrascope", a software program that allows you to check out the bandpass characteristics of your rig's audio thru the sound card on your computer, I compared the two filters. The DSP- 59+ in bandpass mode is definitely superior to the SCAF-1 in terms of bandpass skirts. In the Timewave, the skirts are very pronounced, both on the low and high ends, whereas with the SCAF-1, the bandpass is more gradual. With Spectrascope, you can see how tuning the SCAF-1 reduces the passband from the high end towards the low end of the audio spectrum, but not in a real steep cut-off fashion. I can't quantify my measurements with any precision; but from an observer's perspective, the differences are apparent.

How does that translate to performance? The SCAF-1 is easier on the ears, and, especially on phone, the results are more intelligible than with a narrow bandpass filter from the DSP box. One more plus for the SCAF-1 is its size...2-1/2" wide, 1-1/2" high, and 5" deep. The Timewave is 7-1/2" wide, 2" high, and about 8" deep. The SCAF-1 is smaller and cheaper than the Timewave (which you can't buy new anymore). All-in-all, the SCAF-1 is a good accessory to the 706 series of transceivers, as well as to more serious rigs that you thought didn't need improvement. I recommend the SCAF-1.

FAR Scholarships

THE FOUNDATION FOR AMATEUR RADIO, INC., a non-profit organization with headquarters in Washington, D.C., plans to administer fifty-nine (59) scholarships for the academic year 2004 - 2005 to assist licensed Radio Amateurs. The Foundation, composed of over seventy-five local area Amateur Radio Clubs, fully funds seven of these scholarships with the income from grants and its annual Hamfest. The remaining fifty-two (52) are administered by the Foundation without cost to the various donors.

Licensed Radio Amateurs may compete for these awards if they plan to pursue a full-time course of studies beyond high school and are enrolled in or have been accepted for enrollment at an accredited university, college or technical school. The awards range from \$500 to \$2500 with preference given in some cases to residents of specified geographical areas or the pursuit of certain study programs. Clubs, especially those in Delaware, Florida, Maryland, Ohio, Pennsylvania, Texas, Virginia and Wisconsin, are encouraged to announce these opportunities at their meetings, in their club newsletters, during training classes, on their nets and on their world wide web home pages.

Additional information and an application form may be requested by letter or QSL card, postmarked prior to April 30, 2004 from: FAR Scholarships Post Office Box 831 Riverdale, MD 20738

The Foundation for Amateur Radio, incorporated in the District of Columbia, is an exempt organization under Section 501 (C)(3) of the Internal Revenue Code of 1954. It is devoted exclusively to promoting the interests of Amateur Radio and those scientific, literary and educational pursuits that advance the purposes of the Amateur Radio Service.

Treasurer's Report **By Dave Baugher, WR3L**

Thanks to all for the donations that I have received in 2003. This is how our expenses were divided over the past year. Newsletter was 64%, trophies/plaques (ARRL & CQ) 8%, club awards 15%, donations 3%, insurance 3%, miscellany 7%. Donations accounted for 63 % of income, while newsletter advertising brought in 34%, and 3% was miscellaneous income.

As of December 19 our treasury was \$50.52 less than Jan 1, 2003. This is not our final yearly profit or loss figure. Some newsletter bills have not been reconciled and advertising income billing is not complete.

The newsletter is the most expense to the club when mailed. We are asking that if you wish to receive the newsletter by mail to make an additional donation per year. This is completely voluntary. No one will be deleted from the mailing list if no donation is received.

Thanks again for your contributions, both in scores and financially. I look forward to another year as your treasurer with PVRC staying the most respected club that it is.

The WR3L Packet Cluster Node **By Dave Baugher, WR3L**

Seven years ago I added a node to the Baltimore area with the help of Frank, W3LPL. It gave Baltimore and northeast Maryland a dependable link to the network. I am now upgraded to AR-Cluster thanks to the extensive help and input of W9ZRX. My node is much the same as Frank's for the users. The computers are exactly the same. I will still have the additional Buckmaster data base for your use.

For the last 5 years I have had the GoList and Buckmaster data bases that shared with all the PVDXSN nodes. This will no longer be the case. You must connect directly to *Telnet:WR3L.net* to use the SH/Buck command. The SH/QSL command will work on my node or Frank's but with the AR-Cluster database.

My RF outputs are still on 145.610 and 450.950, and have also been upgraded. Yes, we are still hams using RF. The Telnet nodes will add an excellent source of backup to the entire system. I can't thank Frank, W3LPL and Dave, W9ZRX enough for their valuable assistance.

VHF and Above Radio Frequencies

by Chuck Watts, W4XP

Once thought of as useless, now one of the most sought after resources in the world ... use them or lose them!

When contesting in the HF bands, directional antennas can play a major role in how effective a station is. The need to rotate the antennas is sometimes minimal, so a primary benefit of the antenna(s) is gain and front-to-back ratio. These characteristics are important in VHF and above contesting too, but even more important is the need to rotate antennas A LOT to effectively cover all directions from the central operating location.

Some multi-operator stations solve the need to have antennas pointed in several different directions quickly by simply fixing an antenna in the "opposite" direction from high-population density areas. Others have enough towers to put up several arrays on the "high contact count" bands, usually 50 and 144 MHz. All of these options allow for rapid direction changes to accommodate pass of stations from other bands, or to answer a weak one off the back of the array.

There is another approach being incorporated by VHF stations to accommodate working stations in all directions. The technique is based on the "clock" concept. Stations in the North, that is stations above the Mason-Dixon Line, start at the top of the hour with antennas pointed south. Stations South of the Line point north.

Stations near the East Coast rotate antennas counterclockwise; West Coast stations rotate antennas clockwise. Stations in the "middle" point in the appropriate direction to work either East or West Coast stations, knowing at what time coastal stations will be pointing in their direction.

This technique is useful for Rovers too. Rovers will have a better chance of attracting the attention of the "big guns" if they have an idea of when the fixed, and other Rovers, will have antennas pointed in their direction.

Try this technique in the January ARRL SS and see how it works. I use this method at K8GP and find that stations are usually waiting for me on 222 MHz when I'm scheduled, according to the "clock" method of beam rotation.

If you have suggestions or comments, w4xp@arrl.net is where you can reach me.

PVRC Contest Calendar (2003-2004 season)

Note: All dates are Zulu, boldface denotes contests that count toward the PVRC 5 Million Award

ARRL RTTY Roundup 1800Z, Jan 3 - 2400Z, Jan 4

North American QSO Party, CW 1800Z, Jan 10 - 0600Z, Jan 11

North American QSO Party, SSB 1800Z, Jan 17 - 0600Z, Jan 18

ARRL VHF Sweepstakes 1900Z, Jan 24 - 0400Z, Jan 26

CQWW 160m CW 0000Z, Jan 24 - 2359Z, Jan 25

North American Sprint, CW 0000Z - 0400Z, Feb 1 (evening of January 30 in the US)

North American Sprint, Phone 0000Z - 0400Z, Feb 8 (evening of February 7, in the US)

ARRL International DX Contest, CW 0000Z, Feb 21 - 2400Z, Feb 22 (starts evening of February 20 in the US)

CQ 160-Meter Contest, SSB 0000Z, Feb 28 - 2359Z, Feb 29 (starts evening of February 27 in the US)

ARRL International DX Contest, Phone 0000Z, Mar 6 - 2400Z, Mar 7 (starts evening of March 5 in the US)

CQ WW WPX Contest, SSB 0000Z, Mar 27 - 2400Z, Mar 28 (starts evening of March 26 in the US)

CQ WW WPX Contest, CW 0000Z, May 29 - 2400Z, May 30 (starts evening of May 28 in the US)

If you have other favorite contests, drop a note to N4ZR@contesting.com and I'll include them.

For schedule changes, rules and log submission info, go to <<http://www.hornucopia.com/contestcal/contestcal.html>>

Using a PIC for Antenna Selection

By Brian Alsop, K3KO

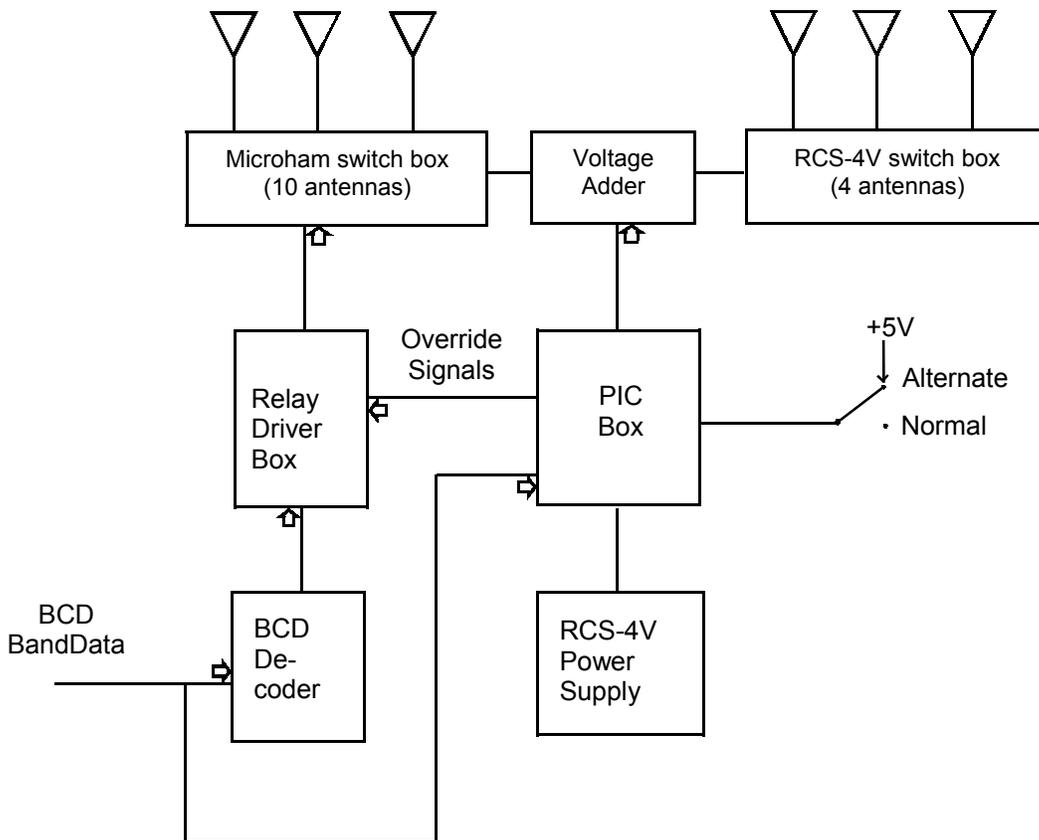
The problem I had to solve was how to easily access alternate antennas in a single radio/single op contest situation. The goal here has been to have a primary antenna in the running direction and a second antenna (fixed dipoles, rotary dipole or 2 el beam in a second useful direction, the most common combination being EU/SA). Even a dipole is 20 db better than transmitting off the side of the beam.

I wanted a single switch which selected the normal/alternate antenna -- regardless of the band. No need to do any thinking; just throw the switch. This sounds easy to do but one has to realize that feedline selection had gotten complicated over the years. For example, getting to the 40M beam requires selecting the coax going to a remote switch box on one tower and then applying the correct voltage over the feedline. The rotary dipole is on another tower with a separate coax. Band data usually feeds the main antenna switch box and has to be appropriately overridden for alternate antennas.

The solution was to feed the band data from the rig to a PIC chip along with a SPST switch and appropriate relay control lines and voltages. The PIC is programmed to figure out how to get to the correct antennas regardless of band. If no alternate antenna exists, it also knows that. Voila, one switch does it all.

The downside (due to my ignorance) was the BASIC STAMP PIC cost \$50. I suppose those more knowledgeable of PIC programming could have used a cheaper chip. However, one would also have to buy a programmer for other kinds of PICS. The BASIC STAMP is programmed with PIC BASIC. One needs to know no assembly language. If one has done any programming at all in BASIC, picking up PIC BASIC is not difficult. Good documentation exists for the instruction set. The STAMP PIC BASIC interpreter/compiler is free. If antennas change, one may be able to accommodate the changes via programming. One could imagine extending the concept to automating more complex antenna farms.

[Editor's note -- Brian does some things here that may be obvious to him, but would be pretty challenging for most of us. A block diagram follows, but for more detailed information contact him -- alsopb@gloryroad.net]

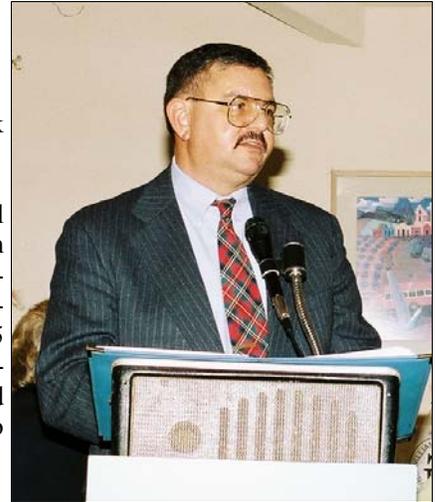


Around the Club

Meeting minutes from the regions

PVRC Holiday Dinner at Anita's Mexican Restaurant on December 8, by Jack Hammett, K4VV

We had a great turnout at the holiday dinner. Chris Imlay, W3KD and General Counsel of the American Radio Relay League gave a very interesting presentation and answered our questions about the BPL issue that may impact our avocation. The current slate of officers and trustees were all willing to continue for another year, and were reelected on a quick and unanimous voice vote. About 85 PVRC members, spouses and guests enjoyed the dinner at Anita's Mexican Restaurant. Thanks to all who made this event a success, including Brian, N3OC and Dave, WR3L who pulled the awards program together, and Bob, KC3VO who provided the PA System.



Awards were presented to many of our members, as follows. Those recipients who were present at the dinner are identified with an asterisk.

ARRL Club Competition Gavels: (1) 2001 ARRL 160 Meter Contest--Bert Michaud N4CW, North Carolina Region; (2) 2001 ARRL 10 Meter Contest--Pete Smith N4ZR*, West Virginia Region; (3) (3) 2002 ARRL September VHF Contest--Brian Skutt ND3F, Northwest Region

PVRC 5 Million Awards:

50 Million Point Endorsement: Bob Morris W4MYA*, Central Virginia Region, 51,939,434 points; Fred Laun K3ZO*, Central Region 51,160,499 points; Tyler Stewart K3MM)*, Northwest Region, 50,413,680 points.

25 Million Point Endorsement: Ken Claerbout K4ZW, Rappahannock Region, 26,642,235 points; Rich Zwirko K1HTV*, Central Region, 26,345,180 points; Jack Reichert N4RV*, Central Region, 26,319,654 points.

10 Million Point Endorsement: Paul Hellenberg K4JA*, Central Virginia Region, 16,764,436 points; John Evans N3HBX, Northwest Region, 15,316,523 points; Wayne Rogers N1WR, Southern Maryland Region, 13,774,700 points, Chuck Reville K3FT*, Northeast Region, 12,399,530 points; Roy Davis WK4Y, Central Virginia Region, 12,365,002 points; Eric Hall K9GY, Central Region, 11,990,816 points; Bill Delage K1SE, Rappahannock Region, 11,074,551 points; Jim Nitzberg WX3B*, Carroll County Region, 11,010,387 points; Bob Eshleman W4DR, Central Virginia Region, 10,882,199 points; Steve Hawley K4EU, Rappahannock Region, 10,736,362 points; Phil Allardice KT3Y*, Central Region, 10,668,638 points; Willie Baber WJ9B, North Carolina Region, 10,295,367 points; Ron Uthus N4MO*, Central Region, 10,281,054 points, Jim Ahlgren W4RX, Central Region, 10,185,173 points, Jim Jordan K4QPL, North Carolina Region, 10,014,885 points;

5 Million Point Award Plaque with 10 Million Point Endorsement: Bruce Plantin W3BP*, Rappahannock Region, 10,235,686 points; (

5 Million Point Award Plaque: Ben Hutchinson N3UM*, Annapolis Region, 9,031,858 points; Hal Kennedy N4GG, Central Region, 8,002,114 points; Steve Beckman N3SB, Northwest Region, 7,124,279 points; Bill O'Mara W4RM*, Rappahannock Region, 6,758,574 points; Mike Barts N4GU, Southwest Virginia Region, 6,541,608 points; Steve Sluz NY3A, Pennsylvania Region, 6,118,944 points Greg Altig NK3R, Northwest Region, 5,643,481 points; Mike Cizek W3MC, Central Region, 5,636,657 points, Roger Kaul K3TM, Central Region, 5,344,252 points; Gerard Jendraszkiewicz KE9I, Central Virginia Region, 5,258,569 points; Bob Turner N2NFG, North Carolina Region, 5,184,409 points.

Sidewinders on Two Radio Club, First Place Multi-Operator, January 2002 S.W.O.T. 144 MHz Contest, Award to Marty Johnson W3SO* (the PA contest station of W3YOZ).

A eulogy to W3AU was presented by Ray, KT4W. A photo was taken afterwards of the former W3AU operators who were present.

The list of attendees follows, in no particular order: Bill-W4RM and wife Lori, Pete-N4ZR, Rick-KE3Q and wife Amy-W3AMY, Dave-WR3L, Brian-N3OC, Jack-K4VV and wife Sharon, Christopher Imlay--W3KD (Speaker), Dave-K3ZJ, Bob-KI3O, Paul-K4JA, Eric-W3DQ, Bob-W4MYA, Bill-K3WA, Gene-AD3F, Carl-K3RV, Dick-K3DI and wife Martha-N3FZB, John-N3AM, Barry-WR3Z, Jim-N3JT and Nina-KE4PSV, Brian-N1KC, Mark-KD4D, Jack-N4RV, Burt-W3GG, Herry-W3UJ, Rob-ND3A, Ed-K3PN, Tom-W3TOM and wife-KA3VNF, Jack-W4NF, Chuck-W4XP and wife Tami, Dick-W2YE, Marty-K2PLF and wife Patty-N6WHB, Ray-KT4W, Bud-W3LL and wife Kayren, Ken-K4ZW, Fred-K3ZO, Steve-W3OU, Bruce-W3BP and wife, Tom-K3TW and guest Alfred Cammorata -W3AWU, Ken-W8JVP, Frank-W3LPL and wife Phyllis, John-N4MM, Tom-K2UOP, Jerry-K8OQL, Marty-W3YOZ, Jim-WX3B, Ralph Karhammar-W3/VK4VBN (5H3RK)--guest of K3ZO, Bob-K3EST, Phillip-KT3Y, Boris-WF3J, Mark-AA5RR, John-W3BE and Betty-N3PKX, Bob-KC3VO, Chuck-K3FT, Jeff-N8II, Maury-W3EF/G0UHK and wife Jennifer (daughter of erstwhile PVR Cer Scudder, KD3P and W3LTW, now SK), John-W3HVQ and wife Margaret, Ron-N4MO and wife Sandra-KT4YI, Bob-W4LIP and guest Gene Kaiser-KI4BUI, Rich-K1HTV and wife Phyllis, Ben-N3UM, Jim-W6NRJ, Dan-N3OPM, Tyler-K3MM +2

CVCC/PVRC -- Our annual Christmas Dinner was held Tuesday, Dec 9th, at the Topeka Steakhouse on Parham Road at Three Chopt Road. There were 31 persons in attendance and all appeared to enjoy themselves. A special thank you to Bob Ladd, NK4H, for charring this event. Good job, Bob!

Bob Morris, W4MYA, gave out several 5 Mil PVRC endorsements to members and Bob Eshleman, W4DR, asked that members participating in the CVCC, (New Band Entities and Percentage factor), club competition, be sure to send to him their 2003 totals as soon as possible after 31 December 2003. Happy Holidays and Happy New Year, see you at the January meeting.

**5M Scorecard
by Bob Dannals, W2GG**

Corrections, additions, etc.-email to rfd@jhu.edu

ARRL 160 #4
19-Dec-03

Call	QSOs	Sections	DX	Score
Single Op High Power:				
W4MYA	1303	75	32	318,646
KT3Y	907	72	31	219,900
K4ZW	916	72	30	212,874
W3BP	964	70	17	178,437
N4XD	861	75	20	172,425
K2UOP	913	68	15	156,787
N8II	777	70	13	133,464
NY3A	711	56	16	108,000
N3ND	637	61	15	100,092
NY4A	606	76	0	97,432
K3SV	607	58	15	92,345
K3ZO	439	55	23	78,078
K8OQL	537	58	6	70,080
WF3J	527	##	#	66,650
W4ZV	345	65	16	60,507
N4MM	270	72	0	41,688
K4MA	340	47	4	35,445
N3AM	290	49	4	31,376
W3EKT	200	54	10	28,896
NX9T	236	55	4	28,556
W2YE	209	47	6	23,267
W8ZA	208	48	3	21,675

K1HTV	900	70	18	166,320
WJ9B	682	65	7	99,936
W4YE	422	63	3	56,496
K4EU	457	51	3	50,004
WX3B	342	56	6	43,542
N3UM	356	52	7	43,247
K3SWZ	307	54	3	35,511
W9GE	###	##	#	30,834
WB4MSG	270	49	0	26,460
N4YDU	203	44	5	20,629
K3DSP	188	47	0	17,672
W3DQ	155	42	0	13,020
W4AU	144	40	0	11,520
N4ZR	159	35	2	11,100
W2GG	120	39	0	9,360
KI3O	104	35	0	7,280

Multi-Op (single op plus packet unless listed below):

W0UCE	1067	72	20	205,712
K3KO	650	83	##	108,896
K3DI	619	61	12	93,221
N6ZO	355	54	6	51,612
W3HVQ	312	58	14	48,168
W4NF	346	49	5	38,178

Logs: 44
Club Score 3,465,338

Operators (non-PVRC):
NY4A: N4AF
W0UCE: N4CW NA4G W0UCE
- missing data

Single Op Low Power:

ARRL CW SS FINAL

22-Dec-03

Call	Prec	QSOs	Sections	Score
N4AF	B	1271	79	200,818
K3MM	B	1188	78	185,328
W4MYA	U	1114	80	178,240
K3ZO	B	1098	79	173,484
N4ZR	B	1124	77	173,096
KD4D	B	1077	79	170,166
N3OC	M	1071	79	169,218
W4RM	M	1037	79	163,846
N4CW	B	986	78	153,816
K2PLF	B	939	78	146,484
WJ9B	A	936	77	143,836
NY3A	A	905	78	141,180
K4QPL	A	904	78	141,024
W3BP	B	900	78	140,400
K1HTV	A	882	79	139,356
W3YY	B	820	78	127,920
N6ZO	U	795	80	127,200
N3UM	B	750	77	115,500
W4NF	U	688	78	107,328
KM4M	B	726	71	103,092
W4YE	A	651	79	102,858
N3II	B	652	78	101,712
W3PP	U	648	78	100,620
W3HVQ	U	635	78	98,748
N3AM	B	639	76	97,128
W4DF	A	606	78	94,536
K3TM	A	618	76	93,936
W2CDO	A	611	75	91,650
K3SV	U	548	78	85,488
W3CB	A	547	76	83,144
K3DI	M	506	77	77,924
N4MO	A	500	77	77,000
K3TW	A	502	75	75,300
K2UOP	B	458	77	70,532
W4ZYT	M	435	78	67,860
K3WA	A	430	75	64,500
K3JT	B	415	69	57,270
K4FPF	A	350	77	53,900
KI3O	A	336	78	52,572
N4MM	B	263	79	41,554
W0YR	A	289	64	36,992
K4RT	A	264	67	35,376
K2AV	B	261	67	34,974
WB4MSG	A	213	70	29,820
W8ZA	B	185	71	26,270
WX3B	U	209	61	25,498
K3KU	A	194	62	24,056
W4EE	A	180	62	22,320
W2DZO	A	236	66	21,152
K1KO	B	154	68	20,944
W4MR	#	150	56	16,800
N3XL	A	129	54	14,040
N4JED	A	121	51	12,342
N8II	A	116	52	12,064
KG4NEP	A	111	53	11,766
W3DAD	A	115	49	11,270

N4TL	B	103	53	10,918
KC9LC	A	103	48	9,888
W8RJL	A	##	##	8,938
K4FTO	A	90	44	7,920
NX9T	A	80	40	6,400
W3XG	A	46	29	2,668
W2CS	A	47	25	2,350
NW4V	A	35	22	1,540

Logs: 64

Club Score: 4,995,870

Other Scores of Interest

WP3R	B	1509	79	238,422
by KE3Q				
K4EU	A	736	78	114,816

Operators (non-PVRC):

KD4D: at N3HBX

KM4M: K9GY at K4JA

N3OC: K3FT WR3Z N3OC

W3PP: N3HUV at W3PP

W4MR: AA4NC

W4RM: W4RM (K5VG)

W4ZYT: W4ZYT W4SD AG4JT N8CH KU4EC

WD4GOY W4PRO

- missing data

ARRL Phone SS FINAL

22-Dec-03

Call	Prec	QSOs	Sections	Score
K3MM	B	1789	80	286,240
K4JA	B	1721	77	265,034
W4NF	U	1586	80	253,760
KD4D	U	1511	79	238,738
N3OC	M	1486	79	234,788
K2PLF	B	1415	78	220,740
K3ZO	B	1328	79	209,824
N3KS	B	1269	79	200,502
N8II	A	1212	79	191,496
K3DNE	U	1055	79	166,690
K3PN	B	1074	77	162,624
NX9T	B	921	79	145,518
K1HTV	A	886	80	141,760
K3DI	M	790	80	126,400
W3PP	U	729	76	110,656
N6ZO	U	706	78	110,000
N3UM	B	689	76	104,728
W3SO	B	745	67	99,830
WX3B	U	622	76	94,544
N3FX	B	640	73	93,440
W3LL	A	605	77	93,170
N4CW	B	578	77	89,012
W2DZO	A	557	76	84,664
KG4NEP	B	540	75	81,000
K3TW	B	538	75	80,700
K4QPL	A	530	76	80,560
N3II	U	482	78	75,192
N4ZR	B	500	71	71,000

W4ATC	M	445	75	66,750
N4MM	A	374	80	59,840
K2UOP	B	382	75	57,300
KU4EC	A	375	73	54,750
K3ZQ	A	###	##	53,424
K1RH	B	334	78	52,104
NI4S	A	338	74	50,024
WK3H	A	342	71	48,564
KU4FP	U	318	76	48,336
W3HVQ	U	332	71	47,144
N4JED	A	328	71	46,576
W3BP	B	317	68	43,112
WB4MSG	B	304	67	40,736
W4YE	A	270	72	38,800
W8ZA	U	252	73	36,792
W3OU	U	241	75	36,150
K2YWE	U	257	68	35,360
NY3A	A	307	56	34,384
WF4DD	S	272	59	32,096
K4FPF	A	225	71	31,950
AJ3M	U	250	59	29,500
W3YY	U	238	53	25,228
KC9LC	A	205	61	25,010
K3SV	U	158	67	21,172
W3CB	A	167	63	21,042
N3KTV	U	188	54	20,304
WA4BKW	A	175	56	19,600
N3VOP	#	160	54	16,960
KE4MIL	A	104	64	13,312
N3FNE	A	126	52	13,104
WA3G	A	117	52	12,168
K4HA	A	108	56	12,096
K1SO	A	120	45	11,040
K4EU	A	115	47	10,810
N3XL	A	110	49	10,708
K3ZE	A	111	46	10,212
K4FTO	A	100	50	10,000
K3DSP	A	88	46	8,096
K3YDX	A	86	47	8,084
AA4KD	A	92	43	7,912
K3GV	B	92	39	7,176
N3WZR	A	72	42	6,048
K1KO	B	77	38	5,852
K9GY	Q	63	36	4,536
W3LRC	A	49	39	3,822
W4MYA	A	42	26	2,184

Other Scores of Interest

WP3R	B	2643	80	422,880
by KE3Q				

Operators (non-PVRC):

K3DI: W3UL K3DI
K3ZQ: W9GE
K4JA: N4GG
KD4D: at N3HBX
N3OC: K3FT WR3Z N3OC

W3LRC: K3HDM N3TZA KA8YPY
W3SO: W3YOZ
W4ATC: WW4MAD4L
W4NF: at W4RM
WF4DD: KG4CZU

SSB Logs:	74			
Club Score				5,362,778
CW Logs:	64			
CW Club Score				4,995,870
Total Logs	138			
Total Club Score				10,358,648

CQWW SSB FINAL
04-Dec-03

Call	Power/ Band	QSOs	Zones	Ctrys	Score
Single Op - Unassisted					
K3ZO	C	2791	123	438	4,431,900
N8II	B	1407	100	342	1,751,204
NX9T	C	1279	95	283	1,329,048
NR3X	C	1174	91	309	1,291,200
K3PN	C	1133	87	303	1,196,130
K2UOP	C	914	98	324	1,073,568
W4ZV	C10	1937	35	138	965,513
N4CW	C	855	78	289	881,728
N3UM	C	900	80	267	870,623
W3YY	C	677	100	322	801,378
W3LL	B	716	77	263	665,380
N3HBX	C15	1571	27	116	611,611
N4MM	C	598	91	267	579,602
K3PD	#	547	85	255	516,460
W9GE	C	575	69	219	459,936
K3DSP	B	568	66	208	435,386
WK3H	B	544	71	216	432,222
W4YE	C	500	55	194	342,873
N4JED	B	460	63	186	304,776
K3JT	C	477	52	149	269,340
N4EL	B	387	50	162	220,692
K1EFI	B	356	52	161	210,018
N4MO	B15	504	27	103	186,420
KI3O	B	###	##	##	133,497
K4EU	B	239	58	135	114,642
K2YWEB		223	61	127	107,536
W3XG	B	191	35	110	76,850
WA3G	B	200	##	###	76,516
W0YR	C20	264	27	83	76,340
KC4D	C	198	46	104	72,600
W3ARS	B	170	##	##	69,921
N3FNE	B	170	40	93	59,318
N4TL	C	135	41	88	47,859
KE4MIL	B	105	30	78	30,780
N3XL	B	108	36	75	26,640
K4FTO	#	83	21	##	12,000
N4ZR	C	85	28	10	9,348
W4XP	B	44	20	31	5,661
K3TW	A40	40	13	24	3,441

AA4KD B20	27	##	##	1,716	(PVRC portion N3OC = 1/6)	3,402,251
N3WZR B	25	8	17	1,475	V26B C 11465 147 545	19,561,904
					(PVRC portion WX3B = 1/6)	3,260,317
Single Op - Assisted					4X/KC8FS B 1221 45 140	609,390
W4MYA C	2239	152	561	4,466,945	MM0LEO B 234 39 116	61,225
K4YT C	1003	101	325	1,166,814	YI3DX B ### # #	24,412
N3AM C	863	96	337	1,053,489	Logs: 66	
K4VV C	852	99	312	980,235	Club Score: 92,334,106	
W3HVQC	585	92	280	594,828	Operators (non-PVRC):	
N3II C	566	92	268	544,680	K4JA: K4MA K4ZW K9JY W3BP K4JA KE9I	
KU4FP C	584	78	244	507,472	(KA9FOX)	
W3OU C	507	##	###	455,178	K4VV: at N3OC	
K3SV C	526	80	233	443,834	N4RV: K2PLF WR3Z KT4W N4RV	
N3ND C	344	69	195	243,144	NR3X: N4YDU	
N3HS B	293	49	172	180,336	W3LJ: W3LJ W3IDT	
N4DEN C	34	14	32	4,186	W3LPL: K1HTV AI3M W6AAN W3LPL KD4D K3MM	
4U1WB C	56	##	##	3,318	K3RA K4ZA K1RA K1RZ NK3R AL7IF	
					W4RM: W4RM W4NF K5OF WA4TK W4CE KA4RRU	
Multi-Single					W4DC (W7IY)	
W4WS C	2324	145	498	4,036,896	W4WS: KG4NEP W2DZO WS4NC WB4MSG KG4CZU	
W3LJ C	445	67	229	356,088	KB6MTH (KG4ECI N0KTY)	
					W8ZA: AC5RR K3DNE K3IXD K8OQL W8ZA WD3A	
Multi-2					YI3DX: W3ICM	
K4JA C	5446	174	675	12,959,985		
W4RM C	4249	157	585	8,753,374		
N4RV C	3568	147	551	6,915,784		
Multi-Multi						
W3LPL C	7060	177	701	16,513,424		
W8ZA C	2348	135	487	4,104,578		
DXpedition						
VP5B C	13103	155	510	20,413,505		

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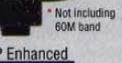
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