CCO RadioSport News

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Looking back over 2003

By Don Cassel, VE3XD

Now that the 2003 contest season has wrapped up let's take a brief look at the activity of the club during the past year. In previous articles we have already heard about our various successes in placing relatively high for a new club in a number of contests but this look is more like one of navel gazing to see where we have been and what we can do to improve for the new year.

Currently CCO can boast of a roster of 132 members. During the contest year of 2003 we have participated in 30 different contests. Using the activity reported for claimed scores on the CCO website a spreadsheet was developed showing all of the entries in the various contests.

The numbers that are shown here are taken from that spreadsheet and can give us some idea of how we are doing as a contest club from an internal perspective. All numbers are statistical in nature and no individual scores or level of activity is being presented. As you can see in Figure 1 a total of 80 of our members entered at least one contest while there were 52 members who never entered a contest. Another way of saying this is that 61% of our membership entered at least one contest while 39% did not.

(Continued on page 2.)

Inside this issue:

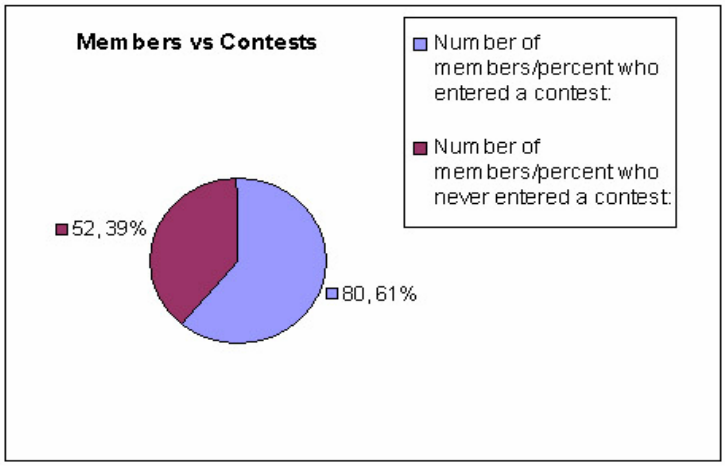

Figure 1 Members who entered a contest versus those who did not.

Propagation

HF propagation—Part one

Understanding the basics

By Ian S. Amos, VE3ESH

When someone starts to talk about propagation most people just nod their heads and say "yes" or "that sounds about right". Most hams know that the sun is a very complex nuclear reactor that is hard to understand.

(Continued on page 3.)

Looking back over 2003

Not shown in this chart is that there were 402 member entries in the 30 contests. This comes from numbers ranging from 19 members who entered only 1 contest (17 entered only 2 contests) to 1 member who entered 22 contests. On average there were 13.4 members per contest. Contests such as the CQ WW and WPX had by far the largest participation while Sprints and Sweepstakes generally had the lowest participation.

CW Only Contests

Contests during the year can be divided into CW only, Phone only, and Mixed mode where you can operate in the mode(s) of your choice. There are also a few Rtty contests but as there was not much total activity in them and many are not eligible for club scoring they have not been considered in this analysis.

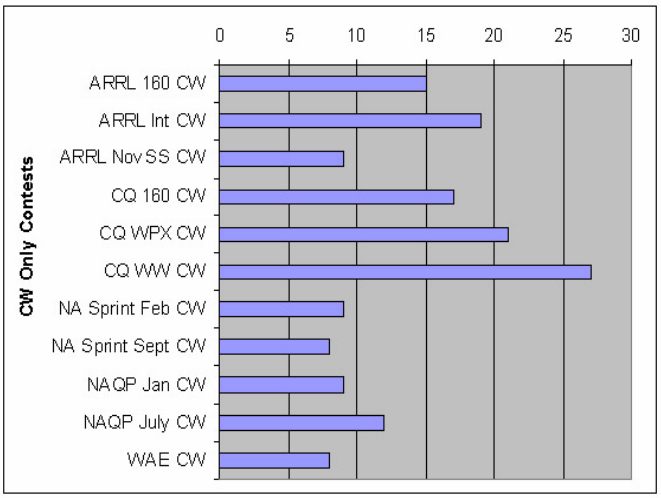

Figure 2 CW only contests participation.

CW only contests include several ARRL activities, CQ 160, WW and WPX, NA Sprint, NAQP and WAE. Figure 2 shows a graph of CCO participation in these contests.

There were 11 of these contests. In total there were 154 CCO entries for an average of 14 members per contest. As the graph shows the CQWW was the most popular with 27 entries followed by the WPX at 21. Worked All Europe (WAE) CW was the least popular with the Sprints right in there as well. Low attendance in the Sprints is not surprising as they are difficult contests to operate requiring a balance of skill, ingenuity and shear doggedness.

Phone Only Contests

Clearly a phone only contest is one where you only operate using SSB. There were 12 of these during the year and a total of 134 CCO members had entries for an average of 11.2 per contest. I found this a little surprising as phone contests are generally easier than CW to operate and would have expected on average more participation in phone.

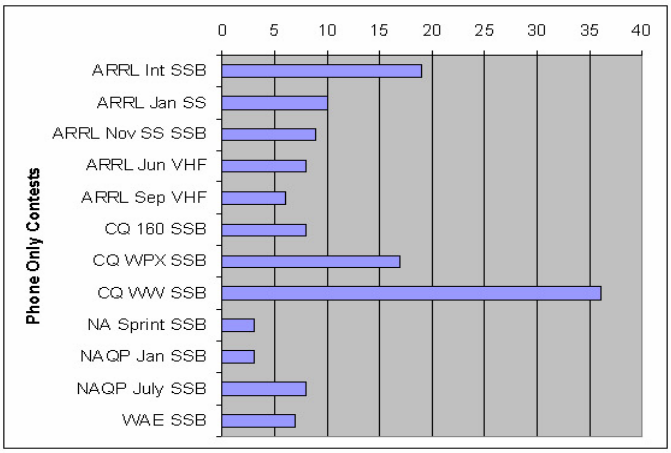

Figure 3 Phone only contests participation.

Figure 3 shows the activity in phone only contests. This includes a number of ARRL contests, again the CQ 160, WW and WPX, NA Sprint, NAQP and WAE. The CQWW was by far the most popular at 36 entries with the ARRL International and CQ WPX far behind at 19 and 17 entries respectively.

Of interest here from the details in the spreadsheet is that frequently those operating in VHF contests are different operators from HF contests. While there is some crossover it seems that the VHF operators have little interest in HF contesting and HF guys show little interest in VHF. Again, as was the case for CW, the Sprint was the lowest attended contest.

Mixed Mode Contests

Mixed mode contests are contests that allow you to operate either CW or Phone or both. Included in this category are the ARRL 10 meter, the Ontario, California and Florida QSO Parties, IARU, and the RAC contests. There were 7 of these types of contests. Figure 4 shows a summary of operation in mixed mode. A detail breakdown was not developed here in chart form because of the large number of values that would be needed to make the chart complete.

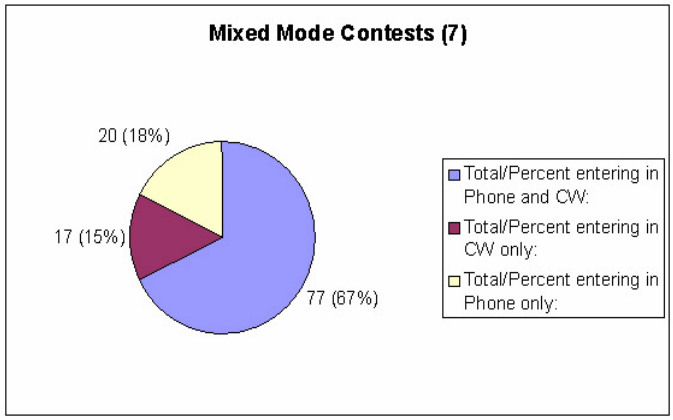

Figure 4 Mixed mode contests participation.

A total of 114 members had entries in these contests. There were 77 members (67%) who entered as both CW and phone for an average of 11 entries per contest. 20 (18%) members entered as phone only for an average of 2.9 per contest. Finally, 17 (15%) entered as CW only, an average of 2.4 per contest. Clearly operating in both CW and phone is much more popular that the other single modes and also results in a greater score all other things being equal.

Of the mixed mode contests the Ontario QSO Party had the most participation with 26 active CCO members. Next came the RAC Canada Day, RAC Winter and the California QSO Party each with 18 members active. At the opposite extreme the Florida QSO Party only had 5 CCO members active.

Conclusion

I hope you will find these numbers to be of interest and more so a challenge to examine your own contesting schedule to see what you can do to improve on your own personal and CCO's results in 2004. If you are one of the 52 members who never entered a contest in 2003 why not set a goal to enter at least one contest this year. This could make a big difference in the total scores for CCO.

For the rest of us, especially those 36 who may have only entered one or two contests, why not look at the calendar for the year and see if you can pick out one more contest in which to participate.

If you had fun in the CQWW why not try the WPX or the ARRL International both of which are similar contests. Or if you find it too boring to be operating the same type of contest then try to find something that contrasts with your usual style.

If you only operate the RAC or the QSO parties then maybe give the WAE a shot. It is really fun and you never need to rotate your antenna. In any event there are lots of contests to choose from.

Whatever you do let's get out there and give CCO a boost and have a little fun in the process. You don't need to be a big gun or get a big score to make a worthwhile contribution. See you in the next contest.

Propagation

(Continued from page 1)

And of course there is the ionosphere with all of its different layers D, E, F and F2, with refraction and ionization, so who really knows.

Well, like many technical things if you do not understand the basics you are lost from the start. Understanding propagation is one of the key elements of communicating by radio, particularly when the sunspot cycle is trending down.

I remember well, in years gone by, you jumped on a band and listened and if it was dead, you had three choices:

- Give up
- Change bands and try again or
- Call CQ.

Many gave up or just listened, but if you knew that an opening was possible because you understood propagation better, you might just call CQ. I used to call CQ on 10 and 15 meters all the time, and I was frequently amazed at the stations that would call back.

I worked some of my best DX this way, as you could actually have a good long QSO, and get to know these rare (and sometimes not so rare) hams.

On the other hand, if no opening was possible, I would call until frustrated, which was not a good thing either. Since then, I have learned about propagation to help me communicate smarter and better.

Now, with the availability of the Internet, all of the solar and ionospheric data is being posted in real-time, we can take advantage of this data to get better at predicting propagation.

Therefore, to predict propagation, all you really need, is just the "Basics".

(Continued on page 4.)

The Basics

To understand propagation better you need an understanding of four main things.

These are:

1. The Ionosphere,
2. Solar Radiation (Solar Flux),
3. The Earth's Magnetic Field (Geomagnetic Activity) and,
4. An understanding of how these three inter-relate.

1) The Ionosphere

The ionosphere is the region of the upper atmosphere that is responsible for effecting radio communication. It is located approximately 40 miles above the earth's surface (the "D" layer) and ends at approximately 250 miles above the earth's surface (the F2 layer).

We describe the ionosphere as a series of layers, because each layer has a different effect on propagation. Propagation is effected by the level of ionization in each layer and the level of ionization is determined mainly by solar radiation. Ionization occurs in the ionosphere because air pressure is low enough to allow electrons to be bumped from an atom and to then move freely for longer period of time before they bump into another atom and recombine into a neutral atom. It is these free electrons that radio waves are bent (refracted) against.

As the level of ionization increases, the more a radio wave is bent. If the level of ionization is high enough, the radio wave will bend enough to be return to the earth's surface (See Figure 1).

Remember that lower frequencies bend easier than higher frequencies, so as ionization increases the more radio waves will be bent back towards earth.

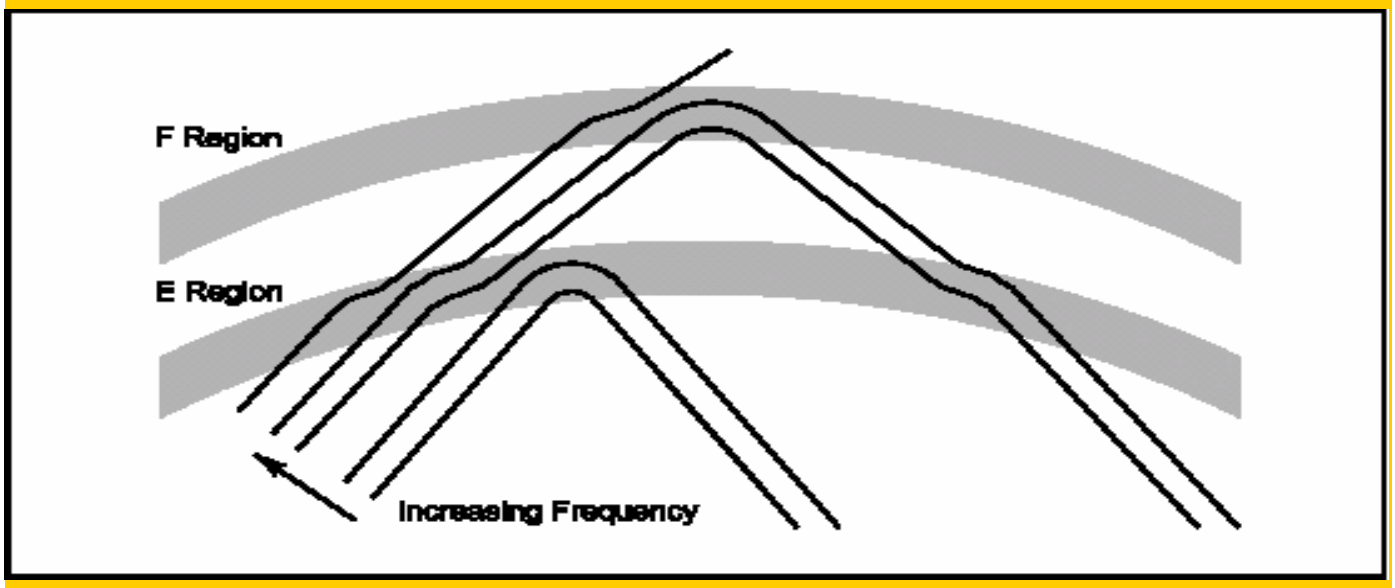

Figure 1 – Radio Waves traveling through the ionosphere will bend depending on the amount of ionization and the frequency

The maximum useable frequency (MUF), is the highest frequency that a radio wave will bend enough to be returned to the earth. Therefore, as ionization increases, so does the MUF. Ionization continues to increase as the sun rises in the sky because of the increased solar radiation and falls as sunset approaches. This is the reason why 17 through 10 meters are better in the daytime than at night. Also note that, radio waves bend on their way up through the ionosphere as well as on the way down.

The amount of bending determines the distance between hops or skips of the signal. The wave may continue to follow this pattern for multiple hops making long distance communication possible. Remember that with each hop or skip, the radio wave's strength decreases until it is unusable.

(Continued on page 5)

2) SOLAR RADIATION

High Frequency (HF) band conditions are constantly changing because of varying levels of ionization, which occurs mainly because of solar radiation. The levels of ionization are dependant on time of day, time of year, but most importantly the solar cycle. The sun emits a constant stream of radiation that rises and falls with the solar cycle. Also, sunspots and solar flares give off large amounts of additional radiation, which further increase the amount of ionization in the ionosphere.

Solar flux is a measure of how much radiation is being received by the earth from the sun and is measured in solar flux units (SFU). The solar flux is measured in Canada every day and is related to the amount of ionization in the ionosphere.

This co-relationship between radiation received and ionization, gives a very good indication of how HF propagation will be. The solar flux number can vary typically from 50 to 300, with a low number (usually less than 100) means poor HF propagation and an SFU of 150 or greater will mean good propagation particularly on the higher HF bands. An SFU of 200 or greater is usually measured at the peak of a solar cycle. SFU of 300 or greater will be seen for only short periods of time and are usually during solar storms.

The three main sources of solar radiation are: 1) the general radiation from the sun itself; 2) sunspots; and 3) solar flares. Sunspots are caused by extremely intense magnetic fields breaking through the sun's surface. After the surface is broken, a large amount of magnetic particles are ejected from the surface, causing the spot to form. Sunspots usually occur in pairs (or groups), which are made up of 2 sides, one positively charged and the other negatively charged. The sunspot continues to emit magnetic radiation until the magnetic field disturbance subsides.

As the magnetic disturbances decreases, the sunspot slowly fades. Solar flares can also happen at anytime throughout the solar cycle and if they are pointed at the earth they will create disturbances in the ionosphere. A solar flare usually occurs near sunspots, along its dividing or neutral line. A solar flare occurs when built up magnetic energy, stored in the solar atmosphere is suddenly released. If this sudden increase in radiation is large enough, an ionospheric storm will occur. These storms can range from minor to severe, and if severe enough it can cause a total radio "black out".

Also, note that a higher amount of solar radiation takes several days of increased values to actually improve ionization and hence improve propagation. This is also true of a decreased amount of solar radiation. As you can see the ionospheres reaction to solar radiation is a key factor in our ability to communicate on the HF bands.

3) GEOMAGNETIC ACTIVITY (A & K NUMBERS)

The earth's magnetic field is constantly changing and is referred to as "Geomagnetic Activity". There are 2 main indicators of the level of geomagnetic activity, and they are the "A" and "K" indices. These two indices give an indication of the severity of magnetic fluctuations, which in turn, relate to how disturbed the ionosphere is. The more disturbed the ionosphere gets, the worse HF propagation will be. The magnetic disturbance is measured through out the day at various observatories around the world. The largest number is selected, and then the "K" index is calculated for the day. The "A" index is a daily average of the earth's magnetic field values. The magnetic disturbances can be local in nature to the observatory, so all of the "K" and "A" values are averaged from all of the observatories around the world to give the "Kp" and "Ap" or the planetary values. Table 1 shows the relationship between the two indices.

Table 1 - Relationship between the A and K Indices

A	K	Definition
0	0	Quiet
2	1	Quiet
3	1	Quiet
4	1	Quiet to Unsettle
7	2	Unsettle
15	3	Active
27	4	Active
48	5	Minor Storm
80	6	Minor Storm
132	7	Severe Storm
208	8	Very Severe Storm
400	9	Very Severe Storm

As the solar cycle rises towards its peak, geomagnetic activity also increases because of the increase in radiation.

(Continued on page 6)

When this higher level of radiation hits the ionosphere, it can affect the ionosphere by creating ionospheric storms, which in turn will reduce HF communication across all bands. Therefore, the lower the K and A indices are, the better HF propagation will be.

4) THE INTER-RELATIONSHIP OF SOLAR FLUX, THE IONOSPHERE AND GEOMAGNETIC ACTIVITY

There is a delicate balancing act between the ionosphere and the earth's magnetic field. Each has there own internal activity, which in turn affects the other, as well as, solar radiation has a large affect on how they both react on a daily basis.

Generally speaking as the ionosphere receives more solar radiation, HF propagation improves, but if radiation increases too much, an ionospheric storm will occur, reducing HF propagation. If the earth's magnetic field is quiet, HF propagation will improve. However, as the earth's magnetic field become active or disturbed, it causes disturbances in the ionosphere, which reduces HF propagation. Also, increasing solar radiation will cause the earth's magnetic field to become more active, particularly in the polar regions.

The bottom line is, a SFU of 150 for a few days will yield good solid HF propagation. The higher the "A" and "K" indices are the worse HF propagation will be and the MUF will decrease. A "K" value of less than 2 for a few days will also indicate good HF propagation.

FINDING SOLAR DATA (WEB SITES)

Use the Radio Amateurs of Canada site www.rac.ca and click on the propagation link. Also very good website for all kinds of solar information and other related links is www.spaceweather.com, or simply search on solar indices to find other related web sites.

If you are an ARRL member, there are lots of great articles, etc. on propagation, as well as you can subscribe to the K7RA Weekly Propagation Report by e-mail. This report is loaded with propagation related information and is one of the best ways to stay on top of propagation conditions.

Summary

I have glossed over a lot of the detail to give a quick review of how to read and use the solar flux and geomagnetic indices. My next article will be HF Propagation Part 2 – Predicting Propagation. I will explain how to predict propagation, using a propagation software program by Sheldon C. Shallon, W6EL. This program will allow you to predict propagation from your QTH to any part of the world by using the basic solar data that was discussed in this article.

Stay tuned for more.

73

Ian, VE3ESH

Acknowledgements for this Article

I would like to thank Tad Cook, K7RA for his "always" fantastic propagation reports from the ARRL and various QST articles for the charts and information that helped me prepare this article.

2003 CQ WW CW

By Don Cassel, VE3XD

This article was originally published by the *Peel Signal*.

With the sunspot cycle steadily declining and numerous solar storms and flares disturbing communications during the month of November expectations were not good for the CQWW CW contest on Nov. 29-30 UTC.

A month ago in the phone contest scores had been somewhat lower than a year ago but in the weeks before the CW contest things did not look good. Not to worry, by Friday the index was at 168 with no storms or flares in sight. It turned out that the only problems were some auroral effects on Sunday over polar paths and trying to break the huge pileups on popular stations that were needed for that extra multiplier.

When all was said and done I had my personal best score of any contest I have operated. 1139 contacts were made for just over 1.3 million points during 30 hours of operating. The real winners were the guys who went 48 hours straight or close to it.

Now I'm the first to admit that I am not a very good CW operator. Although I passed my 15 wpm way back in 1970 it was so I could operate HF phone and as a result, I regret to say, have barely touched a key since then.

But in 2000, a few years after being bitten by the contesting bug, I decided it was time to give CW contesting a try. But how to do this when most operators are sending code in the 25–30+ wpm range? First I started by listening to W1AW code practice sessions and getting my copying speed back up to about 15.

(Continued on page 7)

Although contest code is much faster it has only a very short exchange which you can generally copy after a little practice. In the CQWW you only need to copy the other station's callsign and zone. So that is not too hard and if you search and pounce you can listen to a previous exchange until you get the information you will need before you send your own call.

You need to be able to send your call and zone

It is one thing to be able to receive the code but what about sending. You need to be able to send your call and zone and maybe ask the other station for a repeat if you didn't get it all. If you search and pounce this is not too demanding but I have another solution.

Most contest software provides for rig keying. I use Writelog, but there is also CT (which is now free), TRlog and others which all have the ability to key the radio.

Using a simple switching transistor circuit or a Rigblaster you can program some functions keys in the software to send all the code. So I never touch a key during the contest and have all likely exchanges pre-programmed in the software.

So with these tools I am able to enjoy a challenging contest and even do fairly well at it. I run a low power station (100 watts in CQ contests) and have a Cushcraft X7 yagi at 18 meters with an inverted-vee for 40 and 80 meters (see Figure 1). I do not have a 160m antenna. Generally I only search and pounce in a CW contest which was true of this one.

If you have never worked the CQWW CW here is how the point system for the contest works. For each station worked you get a point. You get a multiplier for each zone you work on each band (there are 40 zones world wide and we are in zone 4). Another multiplier is given for each country worked but there is a difference here.

For your own country you get zero points. That means you can only work one VE in zone 4 for a zone and country multiplier. All other are 0 points so there in no point in working more than one. Other stations on the North American continent get 2 country points (ie. U.S., Mexico, etc.), so you can work as many of those as you can.

Stations outside of North America are worth 3 points so the incentive is to work mostly DX contacts. This is a great way to get new countries for your DXCC.

Figure 1 Cushcraft X7 yagi

The contest began at 0000Z which was 7:00 pm Friday night and ended 2400Z on Sunday (7:00pm). I began the contest on 20 meters thinking that propagation might not support higher bands that late in the evening. Propagation was mostly north and south and it took almost an hour to work 28 stations including breaking the pileup for HC8N Galapagos Island. This station is very strong and attracts big pileups. I was able to work them on 4 bands over the weekend but never heard them on 80 meters. Then I went to 15m and found it open to Japan and worked 13 JA stations. In the next 2 hours 87 stations were worked on 40m the majority of them being European.

By the end of the weekend 342 country multipliers and 108 zone multipliers had made it into the log on 5 different bands. In all 123 different countries and 33 zones were worked. Talk about working DXCC in one weekend. The most often worked countries were the United States (K) 256 Qs, Germany (DL) 62 Qs and Japan (J) 60 Qs. It wasn't until after the contest that I realized I had worked Mongolia JT1CO. Some other interesting contacts came from T32WW Eastern Kiribati where I was pleased to break the pile up at 0113 on 15m and again on 10m at 2025. VP8/LZ2UU came up in my software as the Falkland Islands but I found out later it was actually South Shetland Antarctica.

(Continued on page 8)

Band	QSOs	Zones	Countries
160:	0	0	0
80:	50	8	14
40:	234	21	72
20:	233	27	82
15:	376	27	97
10:	246	25	77
Total:	1139	108	342
Total Score =			1,357,650

During the contest I also worked three other Antarctica stations DP1POL (whose QSL card had just come in the mail a week before), EM1U and RN1ANF.

Other big pileups that I managed to crack were for 5U5Z Niger (4 bands), D4B Cape Verde (4 bands), KH7X Hawaii (2 bands), TF3GB Iceland (1 band), ZF2NT Cayman Island (4 bands) and many others I forget already. Pileups tend to occur for calls where there are few stations in a given country so everyone needs them to get the multiplier. Stations such as T32WW are also in a rare zone so that makes them doubly special. 45 stations were worked on 4 different bands but only seven were worked on five bands. These seven stations were 9A1A, CO8LY, G5W, GM5A, K1TTT, K9NS and W3LPL. Not having a 160m antenna there were no six band contacts.

The table (above) shows my summary for the contest. This shows the claimed score which can be altered somewhat by the contest committee log checkers before the final scores are announced. As of this writing only one other Canadian station has reported beating this score in the low power single operator class but others may be hiding in the woods. This station is VE3JM of Ottawa. Vladimir had 2108 contacts with 108 zones, 374 countries and a total score of 2,577,736. Having put in 43 hours of operating the contest he certainly deserves first place LP in Canada.

Possibly you are thinking that if only you had a big antenna and tower you could also participate in contests such as this. But that's not really necessary to have fun in a contest and that is the main objective for being there. When I operated my first CQWW CW contest in November 2000 my main antenna was an R5 vertical. I had the same 40/80m antenna that I'm using now but it was not mounted as high. With this configuration I was able to make 612 contacts.

I've also worked Phone, Rtty and CW contests in Florida from my mobile station using Hamstick antennas and had a lot of fun doing it. So you don't need a lot of hardware to participate. Give it a try and if I can do anything to encourage you to get started or point you in the right direction email me at ve3xd@rac.ca.

CQ CCO CQ CCO

We continue to expand and increase our presence on the contest scene. We maintained our second place finish in the California QSO Party behind Tennessee's TCG. 2004 would be a good year to reverse that!

Recent results from two major contests also show our real strength in Club Competition. In our class (Medium) in the ARRL DX Competition, we placed third out of 33 clubs, and in the CQ WPX, we placed 18th out of 109 clubs world-wide.

We have a lot of room to move in the other two recently announced results placing 23rd out of 39 in the Russian DX Contest, actually fifth in North America and 11th out of 17 in the Medium class in the ARRL September VHF QSO Party.

I am having a hectic time with my four hats, CCO Pres, RAC columnist and RAC VP and HF Band Planner. I should really reduce this number!

I am proud of the changes in management for the RAC contests. The trio of VE5SF, VE5CPU and VE5RC are really running with the ball. My contesting time, however, is taking quite a hit. There are just so many hours in the week.

I climbed to 50 feet for the first time since December to rescue my 2m beam that was about to take flight from the tower! Summer will be a pleasure, no frostbite, no hardware falling into snow banks, and not as much waiting for the wind to drop below gale force levels!

I would also like to personally congratulate the editor and his contributors for the quality of CCO RadioSport News. Keep up the excellent work.

73, Bob VE3KZ, CCO President.