RAC affiliated MISSISSAUGA amateur radio club VE3MIS

THE COMMUNICATOR

VOICE OF AMATEUR RADIO IN MISSISSAUGA

RAC

VE3MIS/VE3RCX | Vol 13.04 | April, 2010

From the Gavel…

Yay! Spring is finally here! Time to do all that outdoor stuff you've been putting off since last fall. I admit this winter was probably one of the most ho-hum ones we've had in quite a while. Still, it's always good to see life return to the great outdoors.

As I'm writing this tome, MARC (and its PARC counterparts) have just wrapped up another successful Ham-Ex hamfest and fleamarket. This is the ninth Ham-Ex I've been involved in (all as a parking volunteer). The weather this year was about perfect with dry conditions and lots of sunshine, although those of us on parking duty may have a thing or two to say about the pre-dawn temperatures. Rick, IMG, and his crew were onsite both Friday for setup and early Saturday morning getting the vendors in and squared away, and generally making sure everything ran as smoothly as possible. As far as gate receipts go we should know the final numbers soon. However, I was told by a little birdie that the MARC table sold over $600 in high quality jun – er – merchandise generously donated by MARC members. That's an excellent result and one due to the efforts of Asim, XAP, and Scott, NMI, and the rest of the MARC table volunteers. We had a couple of new and returning exhibitors this year including the Icom D-STAR group and AMSAT. And the vendor hall was filled, wall to wall, with vendors selling their wares. I understand this year also was the first time in quite a while that we sold all our vendor tables. Thanks goes to John, XJL, for heading up the table sales and doing a bang-up job getting the place filled. A wrap up meeting (debriefing?) is planned for the near future and we'll get a complete picture on how successful Ham-Ex 2010 was.

Now that spring is in full swing that means fundraising walks. Bob, XBB, will be looking for volunteers for two upcoming events. The first is the MS Society Super Cities walk on April 18 being held both on the lakeshore and in Streetsville. The second is the Juvenile Diabetes walk on June 13 at Streetsville Memorial Park. Both are very worthwhile causes and the organizations really appreciate us being involved with communications end-to-end and along the walk routes. Please give it some thought and put your name down to help out at either (or both!) of these events.

Also coming up is the Streetsville Founders Bread and Honey Festival on the weekend of June 5-6. Dan, NI, and other MARC members will be setting up a special event station on the "island" in the Credit River, where the trees are lush and the breezes soothing. And, of course, the big event on June 26-27: Field Day. As in the past two years, we will be at the Meadowvale Conservation Area. Lorne, CXT, and Tom, TWG, have been getting things organized for this club event. Check the station sign up board at the upcoming General meetings and put yourself down to work one of the bands.

Finally, the coming of April means the end of the club year will be soon upon us. And you know what that means? Club elections! This year, our Treasurer, Scott, NMI, will be finishing off his two-year term and we are looking for people to throw their hat into the ring. In order for the club to grow and evolve it's important to have new blood become involved in club operations. I was Treasurer from 2002-2004 and it really was a good way for me to learn about the club and all the things it is involved in. Please give it some thought and contact Lorne, CXT, if you are interested.

Well, that's it for this month. Bring on the sunshine and warmer temps and see you at the next club meetings!

73 --- Jeff Stewart VA3WXM

This Month

Sunday Brunch

Sunday brunches are held on the first Sunday of each month. Time is 9:30AM at Symposium Restaurant, 6677 Meadowvale Town Centre Circle, Mississauga (at the corner of Winston Churchill Blvd and Battleford Rd). All are welcome to come out and have an opportunity to chat in an informal setting.

Club Nets

2 Metre Tuesday Night Phone Net Join in on the chatter starting at 8:30PM every Tuesday on the club repeater. Hosted by various net controllers. 145.430MHz Tone 103.5 Minus (-) offset. Contact our VHF Net Manager, **Lorne (VE3CXT)**, if interested in becoming a net controller.

75 Metre Sunday Night Net Starts at 8:30PM every Sunday. Hosted by various net controllers. Contact our HF Net Manager, **Michael (VE3TKI)**, if interested in becoming a net controller.

Commentary

It is April and the winter cold is far behind us and the hours of daylight are increasing. Now is the time to get outdoors in the cool spring weather before it gets too hot. Now is the ideal time for that antenna work which you have consistently avoided during last fall and winter.

QSLing, the exchanging of QSL cards, is a large part of amateur radio activity. In this article, the new Ham may find some insight into the why and the how of QSLing.

Be sure to read the Technical Web Site of the Month which focuses on antennas, an essential part of every amateur radio installation.

In keeping with the tradition of April 1st, we have an article on the QSL Burro, a tongue-in-cheek look at the workings of this famed worldwide system for sending QSL cards.

This month, we continue with Part 3 of the Multiband HF Antenna series with a description of the Windom, Carolina Windom, and other Off-Center-Fed dipole antennas.

The Handy Tips column showcases ONE-WRAP by VELCRO, a really neat item which the XYL is sure to approve of.

Having problems with your antenna system? The Coax and Moisture article may give some insight as to why your antenna system has deteriorated, after many years of good service, and provide some solutions for the rebuilding of your antenna system.

The Communicator is one of MARC's methods for communicating information to club members and is your newsletter. Let me know what you would like the newsletter to be and what you would like it to include. I solicit your input on topics for articles i.e. antennas, kits you have built, great operating experiences, operating tips, book reviews, etc. for consideration by the technical committee.

Without your constant support in the form of ideas, suggestions and article submissions, we would not have such a fine newsletter month after month. I look forward to hearing from all you budding or aspiring authors. Your experience is what makes amateur radio what it is. Let's hear from you.

I can be reached at any club meeting or via email at va3tpv @ rogers.com (remove spaces).

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2nd Vice President:	Ki-Hup Boo, VA3PEN
Treasurer:	Scott Gregory, VA3NMI
Secretary:	Asim Zaidi, VE3XAP
Past President:	Rick Brown, VE3IMG

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Special Events / Walks Manager	Bob Boyer, VE3XBB

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Contests Manager:	Asim Zaidi, VE3XAP
Assistant	Rick Brown, VE3IMG
QSL Manager	Michael Brickell. VE3TKI

CLUB CALENDAR FOR 2010

April, 2010
01 Thu Exec Meeting
03 Sat SP DX Contest
04 Sun Sunday Brunch – Symposium Restaurant
04 Sun HF – 75/80 Meter Net
06 Tue VHF/UHF - 2 Meter Net
08 Thu Club Meeting - Speaker's night
11 Sun HF – 75/80 Meter Net
13 Tue VHF/UHF - 2 Meter Net
15 Thu ARES Meeting
17 Sat Ontario QSO Party
18 Sun MS Society Super Cities walk
18 Sun HF – 75/80 Meter Net
20 Tue VHF/UHF - 2 Meter Net
22 Thu Club Meeting - Speaker's night
25 Sun HF – 75/80 Meter Net
27 Tue VHF/UHF - 2 Meter Net

May, 2010
02 Sun Sunday Brunch – Symposium Restaurant
02 Sun HF – 75/80 Meter Net
04 Tue VHF/UHF - 2 Meter Net
06 Thu Exec Meeting
09 Sun HF – 75/80 Meter Net
11 Tue VHF/UHF - 2 Meter Net
13 Thu Club Meeting - Speaker's night
16 Sun HF – 75/80 Meter Net
18 Tue VHF/UHF - 2 Meter Net
20 Thu ARES Meeting
23 Sun HF – 75/80 Meter Net
25 Tue VHF/UHF - 2 Meter Net
27 Thu Club Meeting - Speaker's night
28 Fri CQ WPX Contest - CW
30 Sun HF – 75/80 Meter Net

June, 2010
01 Tue VHF/UHF - 2 Meter Net
03 Thu Exec Meeting
04 Fri Bread and Honey Festival
06 Sun Sunday Brunch – Symposium Restaurant
06 Sun HF – 75/80 Meter Net
08 Tue VHF/UHF - 2 Meter Net
10 Thu Club Meeting - Speaker's night
13 Sun HF – 75/80 Meter Net
13 Sun Juvenile Diabetes walk
15 Tue VHF/UHF - 2 Meter Net
17 Thu ARES Meeting
20 Sun HF – 75/80 Meter Net
22 Tue VHF/UHF - 2 Meter Net
24 Thu Club Meeting - Speaker's night
26 Sat ARRL Field Day Event
27 Sun HF - 75/80 Meter Net
29 Tue VHF/UHF - 2 Meter Net

Provisional Schedule Below

July, 2010
01 Thu RAC Canada Day Contest
04 Sun Sunday Brunch – Symposium Restaurant
10 Sat IARU HF World Championships
16 Fri North American QSO Party - RTTY
24 Sat RSGB IOTA Contest

August, 2010
01 Sun Sunday Brunch – Symposium Restaurant
07 Sat North American QSO Party – CW
13 Fri Worked All Europe DX Contest - CW
21 Sat North American QSO Party – SSB

September, 2010
02 Thu Exec Meeting
05 Sun Sunday Brunch – Symposium Restaurant
05 Sun HF – 75/80 Meter Net
07 Tue VHF/UHF - 2 Meter Net
09 Thu Club Meeting - Speaker's night
10 Fri Worked All Europe DX Contest - SSB
12 Sun HF – 75/80 Meter Net
14 Tue VHF/UHF - 2 Meter Net
16 Thu Club Meeting - Speaker's night
19 Sun HF – 75/80 Meter Net
21 Tue VHF/UHF - 2 Meter Net
23 Thu Club Meeting - Speaker's night
26 Sun HF – 75/80 Meter Net
28 Tue VHF/UHF - 2 Meter Net
30 Thu Club Meeting - Speaker's night

October, 2010
03 Sun HF - 75/80 Meter Net
03 Sun Sunday Brunch – Symposium Restaurant
05 Tue VHF/UHF - 2 Meter Net
07 Thu Exec Meeting
10 Sun HF - 75/80 Meter Net
12 Tue VHF/UHF - 2 Meter Net
14 Thu Club Meeting - Member's night
17 Sun HF - 75/80 Meter Net
19 Tue VHF/UHF - 2 Meter Net
24 Sun HF - 75/80 Meter Net
26 Tue VHF/UHF - 2 Meter Net
28 Thu Club Meeting - Member's night
29 Fri CQ WW DX Contest - SSB

NOTES

1. Meetings start 7:30PM at St. Thomas A Becket Church Hall, 3535 South Common Court unless otherwise noted.
2. Brunch is at 9:30AM unless otherwise noted.
3. Classes are from 7:00PM - 9:00PM at Meals On Wheels at 2445 Dunwin Drive

Visit our website: http://www.marc.on.ca for any updates of the calendar.

QSLing

By Ed Spingola, VA3TPV

You have taken the plunge and made your first QSO. Now what do you do? With many new Hams in the club, this may be an appropriate time to review what QSLing is about and to describe the options for QSLing.

What is a QSL?

From the Basic Qualification instruction class, you may recall that QSL is one of the Q codes which you had to learn. A Q code message can stand for a statement or a question when followed by a question mark (?). Do you remember what QSL means? In this case, QSL means either "do you confirm receipt of my transmission?" or "I confirm receipt of your transmission". A QSL card is a written confirmation of a QSO, another Q code.

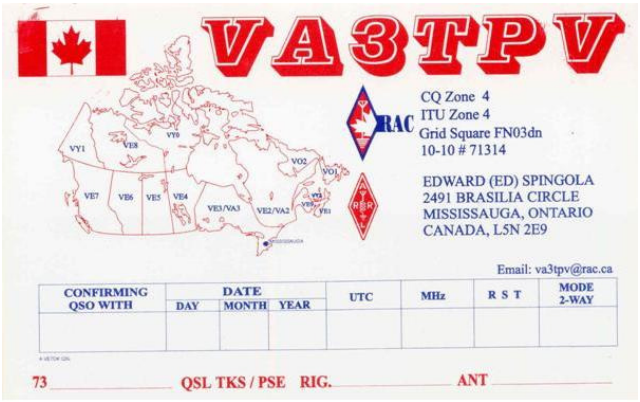

Figure 1: Typical QSL card

QSL cards have a long history in the amateur radio community and are used as a confirmation of a two-way radio communication between two amateur radio stations. A typical QSL card is the same size as a standard postcard. However, vary rarely are QSL cards sent as such through the mail.

To be a valid confirmation, a QSL card must be signed by the amateur radio operator and contain the call sign of the amateur radio operator you are confirming a QSO with, the contact date, the mode, the band or the frequency of contact, the signal report, and the time in UTC (Coordinated Universal Time).

Why QSL?

There are various reasons to send out a QSL card.

- *To request a QSL that will be a confirmation used to apply for an award.*
- *Because you believe that a QSL card is the ultimate courtesy of a QSO and a QSO is not complete until the QSL card has been sent.*
- *Because during your QSO, your partner requested a QSL card.s*
- *Because you received a card confirming a QSO, and the card said "please QSL!"*

QSL cards are a confirmation of your contact and a great conversation piece. There are some very impressive QSL cards being sent by the world's amateurs.

QSL cards also give you some bragging rights to demonstrate your accomplishments as an amateur radio operator.

Operating Awards

A quick look in either The RAC Operating Manual or The ARRL Operating Manual will show many Operating Awards which are being offered by amateur radio societies throughout the world to applicants having the necessary prerequisite proof of contact. These awards also increase your bragging rights.

The most prestigious of the operating awards is the DX Century Club or DXCC award. The basic DXCC award is an amateur radio operating award earned by making contact with 100 or more geographic entities around the world. The DXCC award is granted by (and a registered trademark of) the American Radio Relay League. Radio amateurs worldwide are eligible to apply for this award. Proof of two-way contacts must be submitted to qualify for the award. The usual procedure is to use QSL cards as the proof of contact. Today, other methods, described later, may be used for proof of contact.

Figure 2: DXCC Certificate

There are 16 DXCC awards. Each award is earned the same way: by submission of proof of two-way amateur radio contact using the radio bands and transmission modes called for in the award rules. Mode-based awards are Mixed (any combination of modes), Phone (radiotelephone), CW (radiotelegraphy), RTTY (radioteletype), and Satellite (see OSCAR). Single-band awards are issued for 160 meters, 80 meters, 40 meters, 30 meters, 20 meters, 17 meters, 15 meters, 12 meters, 10 meters, 6 meters, and 2 meters.

DXCC award endorsements are available for each additional 50 entities worked and confirmed after the 100-entity level has been achieved. As an award-holder gets closer to "working them all", the endorsement increments get smaller.

A 5-band DXCC award is awarded to hams who have successfully completed and confirmed two-way contacts with 100 or more entities on the current DXCC List on each of the 80, 40, 20, 15 and 10 meter amateur radio bands. Endorsements to the 5-band DXCC are awarded for working and confirming 100 or more entities on the current DXCC List on any of the 160, 30, 17, 12, 6 or 2 meter amateur radio bands.

More information on the DXCC is available on the ARRL web site[4].

QSLing Methods

There are two basic schemes used for exchanging QSL information. These schemes are:

- Paper QSL cards
- Electronic QSLs

Paper QSL cards may be exchanged either by direct postage, a very expensive method, or via your countries volunteer QSL Bureau system. In Canada, the Radio Amateurs of Canada (RAC) administers an Incoming QSL Bureau and an Outgoing QSL Bureau system[5]. The expense of direct mailing is further increased because it is expected that the amateur directly sending the QSL card also includes a Self Addressed Stamped Envelope (SASE) to pay for return postage. In lieu of postage, one or more International Reply Coupons (IRC) or Green Backs (US dollars) would be provided to pay for return postage.

As an alternative to paper QSLs, there are two electronic QSLing methods, of which I am aware, for exchanging QSLs. These two electronic methods are:

- LoTW (Logbook of the World)[2]
- eQSL (Electronic QSL)[3]

LoTW and eQSL were designed as alternatives to paper QSLs. They offer a lower cost and a more efficient way of confirming the contacts in your log.

With both LoTW and eQSL, you upload your Log to their database via the Internet. Your uploaded log is cross-checked for confirmations with others who have uploaded there logs.

eQSL is an electronic exchange of QSL cards. You receive a copy of the contacts posted QSL card. Be advised that eQSL can generally not be used for awards, and many hams do not accept or wish to participate in eQSL. system. Other than the ARRL, there are perhaps others award sponsors that do not accept an eQSL as proof of QSOs. However, amongst the eQSL.cc member-user community. if your goal is to collect QSL cards, then eQSL may be just for you. See the eQSL web site[3] for more details.

It is noted that LoTW does not support an electronic QSL card exchange. LoTW supports a QSO confirmation, a QSL.

A word about these two electronic QSL methods is required. The LoTW is administered by the ARRL and is open to any amateur radio operator throughout the world. QSO confirmations made through the LoTW are applicable currently to the DXCC award and the Worked All States (WAS) award. Possibly at a later date, the ARRL may include other awards. At this point in time, eQSL cannot be used for any of the ARRL sponsored operating awards.

The LoTW system was initiated by the ARRL (American Radio Relay League) on September 15, 2003. Since that date more than 32,973 amateurs world wide have joined the LoTW. This is a minimal number considering the more than 1.5 million amateurs world wide. However, most major contesters and DXpeditions are uploading their logs. So if you work contests to get that rare QSO required for DXCC, then LoTW is a good choice to join. After all it is free.

Further reading:

I have only scratched the surface on this topic. The October, 2008, Vol. 11.10 issue of The Communicator, has an excellent article by G0RIF titled QSL cards – What are they and how do you exchange them? The content of the article is self explanatory by it's title.

Further information will be found in the RAC and ARRL operating manuals or by searching the Internet on the following text strings:

- QSLing Tips
- QSLing Tips and Advice
- Getting QSLs
- Improving your QSL return Rate
- QSL Cards

References:

1) RAC QSL Bureaus, http://www.rac.ca/en/rac/services/qsl-bureaux/
2) LoTW, http://www.arrl.org/lotw/
3) eQSL, http://www.eqsl.cc/qslcard/Index.cfm
4) DXCC, http://www.arrl.org/catalog/?item=NO-DXCC#top

Technical Web Site of The Month – Antennas

By Ed Spingola, VA3TPV

Antennas are an integral part of every amateur radio installation. This month's, Technical Web Site of The Month, is devoted to Antennas.

Two web links are presented this month.

The W8JI web site, http://www.w8ji.com/antennas.htm, has a number of sections. What particularly caught my attention was the multitude of links on antennas.

This month's second web site is the AC6V web site, http://www.ac6v.com/antprojects.htm, which is another treasure trove of information on antennas.

These web sites have links on just about every imaginable aspect of antennas, modeling, tuners, feed lines, etc.

QSL Burro

From Uncyclopedia, the content-free encyclopedia
http://uncyclopedia.wikia.com/wiki/QSL_Burro

QSL Burro

Your friendly QSL Burro featured on "Animule Planet." This legendary quadruped has faithfully served to transport "QSL cards" (cards that confirm two-way radio communications) since the earliest days of ham radio. Sometimes misspelled QSL Bureau or QSL Buro, the establishment of the QSL Burro system has been mistakenly attributed to either Hämlich Hertz, the 19th century mule-drawn carriage rental tycoon, or Nikolai Tefla, the inventor of the non-stick wireless coil. In fact, paternity testing proved that the Italian Gigolo Macaroni most likely fathered the use of pigs to send Morse code emissions into ether. Having expended all his liras for Pig Chow, he could not afford a postage stamp for the first QSL card, so he trained his donkey to deliver it to the receiving pig on the other side of his farm.

Limitations

The limitations of the QSL Burro became evident as the distances successfully spanned by pig emissions progressively increased.

- The maximum velocity of the burro was 3 km/h or even slower as when it took several years for the burro cross the ocean on a raft to confirm the first Transatlantic signals.
- QSL Burro service is not yet available for contacts with the Astronomical Space Station (ASS).
- In times of famine, the QSL Burro has been known to eat QSL cards. At those times, ham radio operators are advised to use an alternate delivery system.

New Technology

Technology has somewhat improved reliability of the QSL Burro since the FCC assigned it use of the 220-222 MHz radio spectrum which is the natural resonant frequency of its ears. The ears form a horizontally polarized independently steerable diversity reception array used for global positioning and long range navigation.

Future Challenges

The QSL Burro is at risk of being rendered an endangered species by the increasing use of eQSLs and the Logbook of the Earth on the internet. The increasing greenhouse effect of pig ether emissions has also rendered the QSL Burro susceptible to overheating. Donations are being solicited by the QSL Burro Retirement Fund.

Your Friendly QSL Burro

A Recipe for Easy QSL Burritos - "A tasty treat from XE land!"

Ingredients:
Mexican QSLs (burrito size)
Sliced ham
Silicone grease

Grease microwave cavity lightly. Roll sliced ham in QSLs.
Bake at 10.7 GHz. Serve with spaghetti tubing.
Store leftovers in Leyden jar

Multiband HF Antennas, Part 3, Windom and OCF Dipole

By Ed Spingola, VA3TPV

In the first two parts of this series on Multiband HF Antennas, we had a look at the G5RV and its cousins the W5ANB and the ZS6BKW, the Fan Dipole, and the Trap Dipole multiband HF antennas. These antennas are balanced antennas since there construction is symmetrical about the feed point.

In our quest for a single wire HF all band antenna, the attention in Part 3 of this series will look at a class of asymmetric antennas where the feed point is not at the centre of the antenna. These antennas are commonly called Off-Center-Fed (OCF) dipoles. However, before we get in what we commonly think of as an Off-Center Fed Dipole, I will give some historical background on the development of this class of antennas.

Background

In the 1920's radio amateurs were experimenting with single-wire-feed systems to couple the transmitter energy to the antenna system.

The single-wire feedline has been credited to Frank Conrad, 8XK, of Westinghouse, who used it in the broadcast band to feed a quarter-wavelength grounded (Marconi) antenna. The Marconi antenna is commonly what we refer today as a grounded vertical antenna with ground radials.

The next step was made by Landon, 8VN, who connected the single feedwire to the junction of the antenna and an above ground counterpoise[1]. Later Williams, 9BXQ, modified the system by stretching the counterpoise as part of the antenna[2]. Williams had arrived at the T-configuration of Figure 1: Single-Wire Fed Antenna.

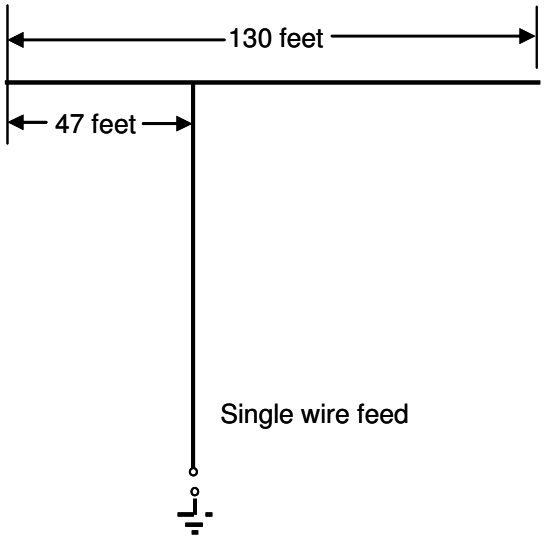

Figure 1: Single-Wire Fed Antenna

Windom

Loren Windom, 8GZ/8ZG, was an amateur radio operator living in the Columbus, Ohio, area. Windom was an active experimenter working on antennas.

In July, 1926, Robert S. Kruse, QST Technical Editor, published an article giving the know knowledge, at that time, of how to feed antennas[4]. The article included a discussion by Windom on how to adjust an off-center fed antenna. The method included hanging an RF current indicator, a light bulb, at the center of the antenna and adjusting the feed point, the point at which the single wire feed is connected to the antenna, for maximum lamp brilliance. This method could only be done on a dark night. Daytime tuning was out of the question. Incidentally, Windom was a Law student at Ohio State University and became associated with John Byrne, 8DKZ, a student in electrical engineering.

The OCF antenna, to become known as a Windom[3] antenna, was described by Loren Windom, W8GZ/W8ZG, in QST, Sept. 1929. The Windom is an antenna fed off-center at the 1/3 point with a single vertical feed-wire, not the familiar two wire ladder line that we may use today. Because of the off-center feed, the Windom is not a balanced antenna. The Windom dimensions are shown in Figure 1: Single-Wire Fed Antenna.

In Windom's QST, Sept. 1929, article, Windom clearly states that he is not the inventor of this antenna configuration but merely the documenter of work done by John Byrne, of Bell Telephone Laboratories, Ed Brooke, also of Bell Telephone Laboratories, and John Ryder, under the direction of Prof. W. L. Everitt of the Department of Electrical Engineering, Ohio State University. Windom gives sole credit to the above mentioned and notes that he is only the reporter. In fact it is a little more complicated than this. Windom had occasionally assisted Byrne with his antenna measurements and was completely familiar with the procedures. Also, Byrne was publishing his work, part of his final year thesis, and did not want to publish in the amateur radio journal. As it turned out due to a delay in the publication of Byrne's article in the Proceedings of the IRE, Oct, 1929, Windom's article was the first in print to describe this work. An Australian amateur radio journal was the first to associate the name Windom with a 1/3 single wire-fed antenna.

Lets summarize where we are at this point in history. We have an off-center-fed multiband HF antenna fed at approximately the ratio of 1/3. The total antenna length is ½ wavelength at the lowest frequency of operation. The feed point of approximately 1/3 is chosen such that there are no standing waves i.e. SWR 1:1 at the operating frequency in the feed-wire. It was well known at that time that the approximate 1/3 feed point was influenced by such factors as antenna wire height and diameter. Thus the antenna needed to be tuned in situ.

Antenna Theory

One of the most important aspects of an antenna is its impedance which is composed of both resistance and reactance. The

resistance and reactance depend upon a large number of factors including height above ground, wire diameter, nearby obstructions, and the length of the antenna compared to a half-wavelength. The feed point impedance can be calculated with antenna modeling programs such as EZNEC, Nec2Go, 4NEC2, NEC4WIN, etc.

It is well know that the impedance of a resonant antenna only has a resistance component and has no reactance. Since the antenna is resonant, the reactance looking into any other point along the antenna, also has no reactance. The inductive and the capacitive reactance cancel as in a parallel tuned circuit.

What about the resistive component of the impedance? For a half-wavelength dipole, the resistive component at the center of the antenna is considered to be 72 ohms when the antenna is in free space. The input impedance at any point along its length can be calculated knowing the input impedance at its center i.e. 72 ohms. When an antenna is very thin, the current distribution along its length is essentially cosinusoidal, as shown in Figure 2.

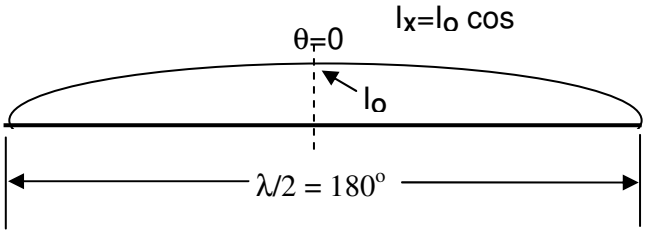

Figure 2: Cosinusoidal Current Distribution

The resistance component of the impedance as a function of length along the antenna becomes

$$R_x = R_O/(\cos \theta)^2$$

Where R_O = 72 ohms, and θ = distance in degrees from the center of the antenna. The theoretical input resistance of a half-wavelength dipole varies from 72 ohms at the center of the antenna to several thousand ohms near the ends of the antenna.

Using this information, Windom, Byrne, et all, found that the 1/3 feed point was a good match i.e. low SWR for a single wire feeder.

Harmonic Operation

Off-centre-fed antennas have an advantage over balanced center-fed dipoles because an off-center fed antenna will also resonate on approximately even-order harmonics. However, because of antenna end effects, the harmonic resonant frequencies are not exact multiples of the half-wavelength resonant frequency. A half-wavelength antenna resonant at 3.725 MHz will also resonate at 7.235, 14.656, 22.077, and 29.498 MHz. Some of these frequencies are out side of the amateur bands. An antenna tuner may help in some situations, but may not be possible in others because of excessive SWR.

Another aspect of harmonic operation is that the antenna impedance increases with increasing harmonic frequency. The resonant frequencies of an antenna are given by

$F_O = 481/L_T$ for n=1 and

$F_O = 492(n-0.05)/ L_T$ for n>1

Where

n is the number of half-wavelengths at resonance

F_O = resonant frequency in MHz

L_T = overall length of the antenna in feet

The following table[13] gives the impedance of a dipole at the fundamental and various harmonics.

- Fundamental: 73 ohms
- 2nd Harmonic: 94 ohms
- 3rd Harmonic: 106 ohms
- 4th Harmonic: 115 ohms
- 5th Harmonic: 121 ohms
- 6th harmonic: 127 ohms
- 7th Harmonic: 131 ohms
- 8th Harmonic: 135 ohms
- 9th Harmonic: 138 ohms
- 10th Harmonic: 141 ohms
- 11th Harmonic: 144 ohms
- 12th harmonic: 147 ohms

Carolina Windom

The Carolina Windom, as the name implies, is a variation of the single wire-fed Windom antenna. The Carolina Windom was devised by Edgar Lambert, WA4LVB, Jim Wilkie, WY4R, and Joe Wright, W4UEB, who modified Windom's single wire-fed antenna to form a dipole fed with a parallel feedline. The Carolina Windom is the first off-center-fed dipole antenna.

The original Carolina Windom was 131 feet 10 inches in length and resonates at 3550 Mhz at a height of 35 feet. The antenna works on the 10 to 80 m bands with a tuner.

There are many variations of the Carolina Windom. However, all have a ratio of 37.8 to 62.2% to the feed point. The version shown in Figure 3 covers the 10 through 80 meter bands with the use of a tuner.

Figure 4 shows a short 66 foot version of the Carolina Windom by K4IWL which covers the 10 through 40 meter bands[21]. This version has a 4:1 balun at the antenna, 10 feet of RG-58 coax, and a line isolator (choke) at the end where it meets the coax to the transceiver.

One final OCF dipole, Figure 5, this time for the 6, 10, 20, and 40 meter bands, is by Rick Littlefield, K1BQT, and was presented in QST, June 2008. What is different about this

version is the inclusion of the 6 meter band and a return to the 1/3 feed point ratio**.** The feed point impedance is 120 to 140 ohms and required a 2.8:1 balun. See the K1BQT article[22] for a description of this 2.8:1 balun.

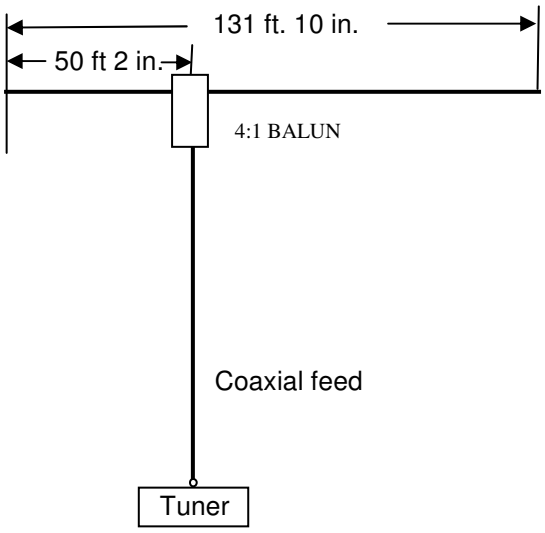

Figure 3: Carolina Windom: 10 – 80 m Bands

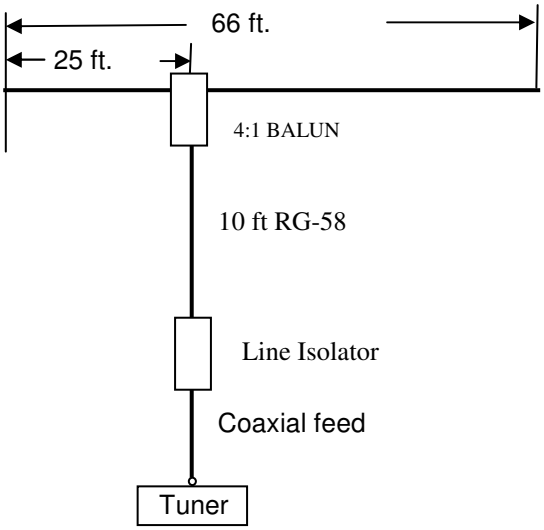

Figure 4: K4IWLCarolina Windom: 10 – 40 m Bands

Making Off-Center-Fed Dipoles Work

Off-center-fed dipoles are by nature an unbalanced antenna. Care must be taken to ensure that there is no feedline radiation to upset the operation of the antenna. Otherwise high SWRs on the higher bands will result. But how can one accomplish this?

A line isolator or current choke at the transceiver end will help reduce radiation on coaxial feed lines. The impedance of the isolator should be at least 4-times the antenna impedance being transformed.

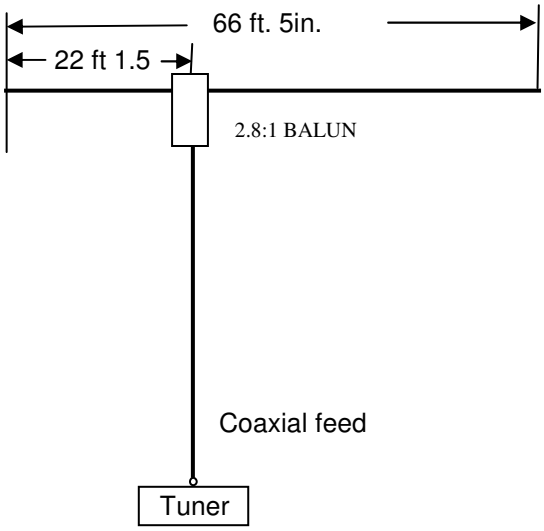

Figure 5: K1BQT OCF Dipole 10 – 40 m & 6 m Bands

Secondly, a good balun should be used at the antenna. An example of how to construct a 4:1 balun suitable for OCF dipoles is given by Zak[13], QEX Mar/Apr 2001.

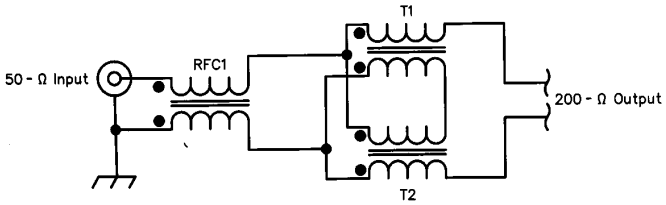

Figure 6: 4:1 Balun

RFC1 is 11 turns of RG-58C on FT140-43 ferrite core. T1 and T2 are 8 turns #20 AWG enamelled wire bifilar wound on FT82-61 ferrite core.

K1QBT's 2.8:1 balun has a similar architecture to Figure 6, however, the implementation is slightly different. To obtain the 3:5 turns ratio, K1QBT used a binocular core consisting of two 1 1/8 x 1/3 inch ID 43-mix sleeves (Fair Rite 2643540002 or equivalent, permeability of 850) cores. The 3 turn primary was made of 16 AWG stranded wire covered with Teflon tubing. The secondary was made of 5 turns of 18 AWG double coated enamelled wire. The 1:1 current balun was made with two 1 ¼ inch OD 43-mix toroids (Fair Rite 59430016012 or FT120-3) stacked together. The transmission line consisted of 12 turns of twisted pair made from 18 AWG high temperature wire wound together with 4 to 6 turns per inch.

Ultimate Off-Center-Fed Dipole

Serge Stroobandt, ON4AA, has produced, in my opinion, the ultimate OCF diploe, a "6-Band HF Center-Loaded Off-

Center[19]" version using a combination of centre loading and off-centre-feed for multiple bands. See the Figure 5.

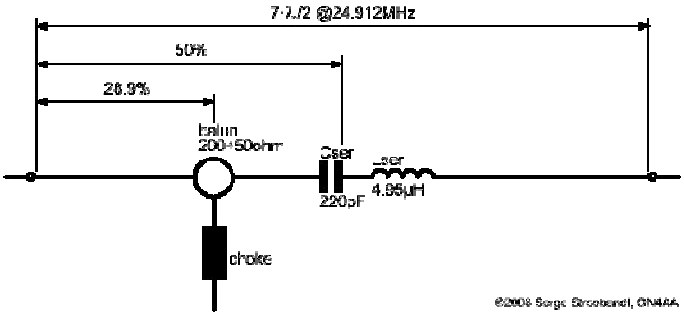

Figure 7: ON4AA 6-Band Center-Loaded Off-Center-Fed Dipole

ON4AA's web site gives a comprehensive history of the off-center-fed dipole's development and the technical rational for the various designs which ultimately lead to the final design. The 6-Band Center-Loaded Off-Center Fed Dipole is more complicated to build than the standard OCF dipole. However, the performance is greatly enhanced by providing a usable antenna on 6 bands instead of the usual 4 bands.

The ON4AA antenna works without a tuner over the entire bandwidth of the 80, 40, 30, 20, 15 and 10m-band, simply by adjusting the output-tank of your tube power amplifier. (If you have a transistor amplifier as a final stage, you definitely will need an antenna-tuner though.)

You can download the NEC modeling file for this antenna from the ON4AA web site[19]. Try this NEC modeling file to see the antenna's performance.

The ON4AA antenna is 40.658 meters in length, which is 7 ½ wavelengths at 24.912 MHz. The antenna is constructed and tuned as follows:

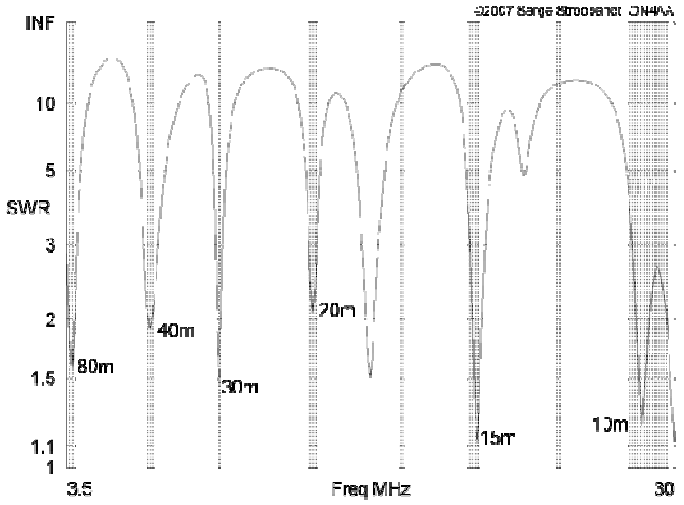

Figure 8: 6-Band SWR Plot

Tuning the ON4AA Antenna

1) First determine the actual length which will resonate at 24.912 MHz. This length will be approximately 40.658 meters, more or less, depending upon height, ground factors, near by obstructions, etc. Start with a 42 meter wire.
2) Prepare a 24.912 MHz half-wave resonant length of coaxial cable with the choke attached.
3) Cut the antenna wire in the middle by folding it and holding both ends.
4) Connect the coaxial cable prepared in step 2 to the center of the antenna.
5) Hang the antenna at its intended height, and measure the frequency where the antenna resonates. Write this value down.
6) Lower the antenna and trim of a few centimetres.
7) Re-measure the resonant frequency. Repeat steps 5 to 7 until the resonant frequency is exactly 24.912 MHz.
8) Remove the choke and connect the L and C loading network at the centre of the antenna.
9) Measure 28.9% of the total length and cut the antenna at this point to connect the 4:1 balun.
10) Hoist the antenna to its final height and begin having fun.

Summary

In the above antennas, the design strategy has been to choose a feed point i.e. offset ratio, which gave a common or close to common impedance on as many bands as possible. In some cases the feed point ratio was such that the feed point impedance was approximately 130 or 200 ohms necessitating the use of a 2.8:1 or 4:1 balun respectively.

The shorter 66 foot versions are also worth consideration for those that do not have the space for a full size 80m antenna.

All the antennas presented must be tuned in situ for best performance.

The ON4AA antenna promises the best performance in a single wire, no trap, multiband HF antenna. The ON4AA antenna resonates on the 80, 40, 30, 20, 15 and 10m-band and is definitely the one to try for those that have the space.

Further Reading

The references given below provide a wealth of information on the Windom and Off-Center-Fed antennas for those wishing to delve into the mystery of these antennas.

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18) W8JI, "Windom Off center," http://www.w8ji.com/windom_off_center_fed.htm
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21) A Winning Antenna, Len Carlson, K1IWL, QRP Expressions, http://www.w5fc.org/files/how-to/QRP%20Expressions_version_1.pdf
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Handy Tips –One-Wrap Straps

By Ed Spingola, VA3TPV

Here is a neat product that will tidy up your cable runs. VELCRO has a product called ONE-WRAP Straps which is used, as the name suggests, to wrap up or tie up cables into a bundle. Thus keeping your cable runs neat. Something the XYL will appreciate.

The ONE-WRAP Straps come 5 to a package and are of different colours and may be used both indoor and outdoor. Each ONE-WRAP strap is 8 in. by ½ in. or for the metricized 20 cm by 13mm.

The advantage of these straps is that they are re-useable. Wrap the ONE-WRAP strap around object, then back onto itself to prevent loss. Wrap a strap onto itself for a secure hold. The price for this product is $4.59 each + Tax per package at RONA.

Coax and Moisture

By Ed Spingola, VA3TPV

Many Amateurs find out after many years of coax installation that moisture is the bane of coax. The coax shield being of a woven copper material serves as a wick to moisture. Eventually the copper shield corrodes increasing attenuation and eventually complete failure.

There are several products on the market which may alleviate this moisture problem. Coax-Seal, by Universal Electronics, Inc., is a self-vulcanizing tape which is easy to install, is non-contaminating, and non-conductive. It is also very difficult to remove. My trick is to first wrap the connector in vinyl electrical tape. Then apply the Coax-Seal over the electrical tape.

Another product which may be used for moisture sealing connectors is Scotch 2242, a Linerless Rubber Splicing Tape by 3M.

This is an Ethylene Propylene Rubber (EPR) based self-bonding tape used for insulating cable splices.

Be careful when installing coax. A knick in the vinyl jacket may cause problems with moisture at a later date.

Do not use household silicone sealant around your connectors. Household silicone sealant is acetic acid based and will corrode your connectors.

NR6CA's web site outlines some cautions in the use of coaxial cable. (http://www.nr6ca.org/coaxcaution.html)

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