

MAY 85

THE GROUNDWAVE



Club Call VE3RC

Repeater VE2CRA



THE GROUNDWAVE

Official Bulletin of the Ottawa Amateur Radio Club, Inc.

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THE OTTAWA AMATEUR RADIO CLUB, INC. is an association of Radio Amateurs devoted to the promotion of interest in Amateur Radio communications in the National Capital Area; and to the advancement and achievement of club members.

THE CAPITAL CITY NET meets every Monday at 2000 hours on the club repeater VE2CRA (146.34/.94) to pass traffic and to make announcements of interest to Amateurs in the National Capital Region.

THE SWAP NET, is a service provided and conducted by Ed Morgan, VE3GX. This feature appears on the Capital City Net as noted in the foregoing paragraph. To list items and make inquiries, call Ed Morgan at 733-1721.

THE OARC EXECUTIVE normally meets on the second Wednesday of each month in the Board Room of CFRA, 150 Isabella St., Ottawa, at 1930 hours. Contact the President to confirm the date of the next meeting.

DEADLINE FOR COPY is 4 weeks before the next meeting. Make yourself better known to fellow members and other amateurs, too, by giving us an article, technical or otherwise, relative to our hobby. They may get reprinted in far away places; and the family will be proud of you.

REGULAR MEETINGS of the OARC, Inc., are held on the first Wednesday of each month (except July and August) at the National Research Council Auditorium, 100 Sussex Drive, Ottawa, at 2000 hours. A bulletin board is available for posting notices of interest to other members about 1915 hours. Further details about each meeting is elsewhere in this publication.

MATERIAL PUBLISHED herein does not necessarily represent the official OARC viewpoint. Items may be reprinted by Amateur Radio or other publications provided that proper credit is given to the author and to the OARC, Inc.

SAFETY BELTS, 2-METER RIG AND AN ENGRAVING PENCIL are available for loan to club members. The 2-meter rig may be borrowed by members who are hospitalized. The engraving pencil (to mark valuables for identification in case of loss or theft) and the safety belts with pole straps are available to any member.

A \$100 refundable deposit is required for the belts. Contact the President for the 2-meter rig or the engraving pencil; and Paul, VE3ICV, at 820-6643 (West End) or Brian, VE3JKZ, at 523-1535 (East End) for the belts.

RADIO AMATEUR CALL BOOKS are available at many local libraries. Ask at the information desk.

Minutes of OARC meeting, April 3, 1985

The meeting was called to order by the president, Dan Holmes at 2008 hrs. The minutes of the March 6 meeting were approved without any changes. Visitors were welcomed by the president. We had the pleasure of welcoming two newly licensed members of the fraternity: VE3 PAP and VE3 PAJ.

Mailes announced that VE6VW is looking after Canada Day contests. New rules are in effect:

1. Fifty bonus points are to be awarded to any amateur providing communication for Parks Canada from a national park during Canada Day Contest 85.
2. Fifty bonus points to be awarded to any amateur who uses the special prefixes for the National Parks Centennial during the Canada Day Contest 85.

Information on what transpired from the meeting of the St Lawrence Repeater Council can be obtained from Merv.

Chris Rochefort, the keen young PRO went to the podium. He told the audience that he will tackle his new job on two fronts:

1. Internal public relations. He will try to make visitors and newcomers feel at home in the great tradition of good old ham and Ottawa hospitality.
2. External public relations. He will make sure that the media and the public at large know who we are and what we are doing whenever we do whatever we usually do.

Dave VE3JTZ also gave some clarification on the role he intends to play. He would like to start with a bank of technical information where old and new hams can get the kind of help they need to solve some particular problems. Get involved. Give him your suggestions.

It was homebrew night and, again, we got a real lift from those who entered equipment and gadgetry. After the judges had deliberated it was like this:

Dave VE3KMV 1st place
Keith VE3IMT 2nd place
Yng VE3FUB 3rd place

A lot of people gave a positive response to Rick HVA: Apparently bulk purchase is alive and well. Interested parties should start making a list as soon as possible.

The meeting was adjourned at 2150hrs.

Next OARC Meeting: Wednesday May 1, 8:00 PM in NRC auditorium,
100 Sussex Drive

David Goodwin-Hill VE2ZP will present a talk on HF Contesting, as well as several highly entertaining videotapes on the subject. He is currently a director of the International Radiosport Association, and was former editor of Contest Scene in TCA. David is also chairman of this year's OARC Field Day committee.

JOE NORTON TRUST AWARD - APPLY NOW

If you are a new Amateur, having received your first certificate since 1984 June 1, you may be eligible to apply for the first Annual Joe Norton Trust Award. Review the April issue of THE GROUNDWAVE for details or contact any member of the club executive.

NEW - TECHNICAL COORDINATOR

David Anderson VE3JTZ has been appointed to the newly-created Technical Coordinator's position. David has been the key person responsible for the technical operation of VE3JW. He will apply his experience from there to provide technical assistance to new amateurs in the club, advising them on how to set up their station. He is available to answer questions of a technical nature from club members, either directly, or by directing them to another member or appropriate committee.

He will also be responsible for suggesting technical topics for club meetings and other technical activities. An orientation program for new amateurs and a technical library are currently being investigated.

David welcomes your questions or suggestions. Contact him on the air or at his phone number/address on the back cover of THE GROUNDWAVE.

The Smiths Falls Amateur Radio Club will hold a flea market on Saturday May 4 at the RCAF Association Hall, 44 Abbott St., Smiths Falls. Doors will open at 8:00 AM. Indoor tables are available by contacting Baxter Smith VE3BFX at (613) 283-7852 or on the air, or by writing the SFARC at P.O. Box 1256, Smiths Falls, Ont., K7A 4T1.

The credit for the news item on the last page of the April GROUNDWAVE was inadvertantly dropped. Thanks to TAPR Packet Status Register.

The following visitors to the club were welcomed at the April meeting:

George Berthiaume	Denis Rule
Fred Chilton	John Haire
K.B. Rodd VE3OWY	Colin Currieaw VE3PAJ
Chuck Baker VE3PAP	Ken Duncan VE3KE

The Ottawa Amateur Radio Club extends a sincere welcome to those visitors who have just recently entered the hobby and wishes the best of luck to those currently studying for their tickets.

RAMBLINGS

Peter Hafichuk VE3LBW

Readers may have noticed that postage stamps have not been used on THE GROUNDWAVE for several months now. Instead, our club has obtained a permit which is printed on the address page of each copy. Then at each mailing the copies are counted and a single total payment is made. Last month THE GROUNDWAVE was mailed on Tuesday and some members received their copy on Thursday. One advantage is that stamp cancellation is not required so handling is reduced. We can mail a deluxe issue up to 600 grams for the same rate (let's see those articles! ed.). Also, staples are inserted so that no sharp points are exposed when the publication is folded and sealed with tape. This pleases postal workers.

Recently, reminder notices were sent to members who had not paid their 1985 dues. Unfortunately, some were accidentally addressed to members who had already renewed. Our apologies to those persons. On the other hand, some members did not know they were in arrears and welcomed the notice. We aim to do our best, and have a few back issues of THE GROUNDWAVE for you.

HOMEBREW REVIEWED

Members and visitors who attended the April meeting viewed numerous items of amateur radio gear designed and constructed by members of the club. "Homebrewing" was again shown to be secretly thriving in local area shacks and workshops.

Wayne Getchell VE3CZO, although not officially participating in the contest, presented his implementations of the Fast Scan TV equipment which he had described in recent issues of THE GROUNDWAVE.

David Harris VE3KMV was awarded the DARC Technical Achievement Award for his entries in the 1985 Homebrew Contest. David presented several projects - a 10W 6 metre linear amplifier, two types of 6 metre antennas constructed from copper pipes and CB whips, and an "instapeater" (instant repeater) controller.

Taking second place was Keith Ballanger VE3IMT who presented a portable 10 GHz FM transceiver using a Microwave Associates Gunnplexer assembly. Keith is looking for other people interested in 10 GHz operation and would be glad to hear from you if you are interested.

Once again presenting a winning entry, last year's top-place winner Ying Hum VE3FUB demonstrated a very portable two metre antenna. When folded up, the 1/4 wave antenna with its two radials, constructed of sections of a metal tape measure fit inside an open-ended 35mm film cannister.

Doug Burril VE3CDC showed a gutter-clamp style of 2 metre antenna. The antenna was constructed of standard parts such as medium size battery clips.

Brett Delmage VE3JLG displayed yet another portable packet radio station. This system was designed out of readily available assemblies and could be easily duplicated by anyone.

Peter Hafichuk VE3LBW presented a 2 metre 1/4 wave antenna which he constructed for the 1985 Ski Marathon, at the last minute using materials at hand, proving his "ham ingenuity".

Judging the entries were John Hay VE3HPW and Wayne Getchell VE3CZO, both previous winners of the Technical Achievement Award and the club's new Technical Coordinator, David Anderson VE3JTZ. The judges spent considerable time deliberating before choosing three winners, and like previous judges, had a difficult decision.

Thanks to Bytown Marine for their assistance in providing the three books presented to the winners.

MANAGING EDITOR REQUIRED

A Managing Editor is required for a large-circulation, highly-respected monthly publication. If you have a Journalism degree, 15-20 years experience editing wide-circulation monthly publications and are a well-known Amateur Radio operator then you may be the right candidate. The position offers absolutely no remuneration, long hours and nothing but headaches. Send your resume, in strictest confidence to:

Box 8873, Ottawa, Ont. K1G 3J2

or better yet.. contact Brett VE3JLG on the air or at 820-3940 for the *real* story.

SOME DATES TO NOTE * * * SOME DATES TO NOTE * * * SOME DATES TO NOTE

- April 1 From this date through May 31, active and reserve naval personnel may use VC, CF, and CY to replace VO, VE, and VY respectively (CARF Bulletin)
- May 11 Halifax Amateur Radio Club inc. announced that the Annual Metro Flea Market is scheduled for May 11. Check with any Halifax area ham for details. (Hfx ARC Bulletin)
- May 11 The Ontario Trilliums are holding their 20th Anniversary Dinner at the Howard Johnson Hotel, Progress Court in Scarborough. Price \$20.00 cheque or MO to Beverley Omstrup VE3LZU, 1177 Tanzer Court, Pickering, Ontario L7W 3T8, Tel: 839-0896. OM's may attend as invitees (Tot-Topics)
- May 17-19 Rochester Hamfest, Monroe County Fairgrounds, for more information write Rochester Hamfest, 300 White Spruce Blvd., Rochester NY 14623 (Guelph ARC newsletter)
- June 1 The 11th Annual Central Ontario Amateur Radio Fleamarket and Computerfest, Saturday 8:00 a.m. to 4:00 p.m. at Regal Hall, 340 Woodlawn Road West, Guelph. Talk-in on 52-52 Simplex or 147.960 - 147.360 VE3ZMG. Further detail from any of these area code 519 numbers: 836-2097, 824-1157, 822-8323, or 822-4367. belonging to VE3BJX, VE3HGZ, VE3HC, and VE3IH respectively.
- May 25 The Annual Southern Ontario Repeater Team Amateur Radio Flea Market will be held at Medway High School. Location of Medway High School is just east of Highway 4 on Medway Road. Medway Road is two miles north of London City Limits on Highway 4. Highway 4 is the road north from London to Clinton. Market will operate from 8:00 a.m. to 2:00 p.m.
- June 22-23 CRRL Field Day. You are once again reminded that this is not the last weekend in June.
- June 30 and July 1, Canada Day weekend. The National Parks of Canada organization is endeavouring to establish a phone net between its main display at Toronto's Harborfront building and as many National Parks as possible during this weekend. Anyone in a position to contribute to this activity is invited to contact the national coordinator for the amateurs, Gordon Murray, VE3JSJ, 294 First Avenue, Ottawa K1S 2G8.
- Sept 27-29 The 17th Annual RSO Convention. Planning is well underway and space is being booked at a rapid clip according to the committee. Have you still got your \$2.00 discount coupon that was handed out at the last convention?

SPECIAL NOTE: The Halifax ARC Bulletin notes that Sauli Arosankari, VE1AIH was in a serious car accident a couple of weeks ago. He is in Victoria General Hospital in Halifax, Room 2A-86-Bed #4, telephone (902) 428-2110. Sauli is a well known DXer with many friends in this area who will want to wish him good recovery.

BEGINNER'S CORNER: THE VERTICAL ANTENNA

Bruce Lauer VE3MJV

The vertical antenna offers several advantages to the radio amateur:

- o It is neat in appearance, modest in cost, and occupies minimum space
- o It may be mounted on the ground, on a rooftop or on a mast
- o It is relatively portable and is easy to erect and tune
- o It produces a low angle of radiation close to the horizon, making it ideal for DX

ON OR ABOVE THE GROUND ?

The vertical may be mounted over actual ground in which case an image antenna can be considered to extend down below the ground surface to a distance equal to the height of the antenna. In effect, therefore, we have doubled the actual length of the antenna. In theory, a quarter wavelength ($\lambda/4$) grounded vertical behaves as a half-wave ($\lambda/2$) dipole suspended vertically in free space. The reason the antenna usually deviates from its theoretical performance is that the ground is not a perfect conductor. Ground resistance thus causes dissipation of power which would otherwise be radiated. If you decide to opt for a ground-mounted system, you should expect to direct a large portion of your efforts to reducing ground resistance.

If mounted in the air, a quarter-wave antenna can make use of a simulated ground consisting of 2 and preferably 4 or more $\lambda/4$ wires radiating from the base, each radial in any given pair arranged to oppose the other in direction. If the vertical element and any one radial are considered, we again have, in effect, a half-wave dipole electrically. The reason for arranging the radials to oppose each other is to allow the actual $\lambda/4$ vertical element to radiate in all directions and to minimize half-wave directive effects. What happens is that each of the $\lambda/4$ radials cancels out the opposite's effect. While an infinite number of $\lambda/4$ radials in a circle at the base of the antenna is ideal, four radials at right angles to each other is practical. The advantage of mounting your vertical above ground is that it will enable you to radiate a signal above energy absorbing structures which often surround antennas at ground level, particularly in the city. Also not to be ignored is the fact that by elevating the antenna, ground losses are virtually eliminated and up to 3 dB gain is achievable from the antenna and its image, which together form a collinear pair.

GROUND-MOUNTING: HOW MANY RADIALS ?

While fewer and fewer radials are required when we elevate a vertical into the air, the situation is drastically more complicated if the antenna is to be mounted a foot or two off the ground. In such a case, we need 50 - 150 $\lambda/4$ radials to shield the antenna from the lossy ground in the immediate vicinity of the base, whereas as previously indicated, only 3 or 4 would be required when the base is raised $1/2\lambda$ into the air.

How tempting it is to dispense with radials entirely and use only a ground rod at the base of the antenna when mounting close to the ground! As the author found out, the end result of this short-cut is a weak signal with attendant marginal QSOs. The reason for this is that, unless you live in a swamp -- or even better, in a salt water marsh, transmitter power is dissipated via I R losses due to resistance between the rod and the ground or the ground-resistance generally in the vicinity of the antenna. One of the characteristics of a vertical antenna is that there is a high current density in the area around and beneath the antenna. In other words, the ground provides the return path for the antenna current. There is unfortunately a difference between a physical ground sufficient for lightning protection and an electrical ground for HF work!

The efficiency of an antenna system may be defined as the ratio of the power radiated by the antenna, P_r , to the power supplied by the transmitter, P_s . This ratio can be expressed as a percentage by multiplying by 100:

$$\text{Efficiency} = 100 \times P_r/P_s \quad (1)$$

The power radiated by the antenna, P_r is the product $I^2 R_r$ where R_r is the radiation resistance of the antenna (36.5Ω for a $\lambda/4$ radiator). The power supplied by the transmitter, P_s , is dissipated primarily through the radiation resistance of the antenna, R_r , and through the ground resistance, R_g ie. $P_s = I^2 (R_r + R_g)$. Thus we can rewrite Equation (1) as follows:

$$\text{Efficiency} = \frac{P_r}{P_s} \times 100 = \frac{I^2 R_r}{I^2 (R_r + R_g)} \times 100 = \frac{R_r}{R_r + R_g} \times 100 \quad (2)$$

Note: It is recognized that Equation (2) is an over-simplification. The efficiency is actually the ratio of the radiation resistance (R_r) to the total resistance of the system, R_t . R_t includes radiation resistance R_r , ground resistance R_g and resistance in conductors, dielectrics and loading coils, the latter three being generally negligible for vertical radiators.

For soil in residential areas, R_g can be as high as 6500Ω , If we assume a ground mounted vertical employing no radials. In this case:

$$\text{Efficiency} = \frac{36.5\Omega}{36.5\Omega + 6500\Omega} \times 100 = 0.56\%$$

For marshy soil, R_g is about 125Ω and in this case things are more optimistic: the efficiency is 22.6%. But by using 40-50 radials, each only $.2\lambda/$ in length and placed about 1" below the earth surface, it is reported that R_g can be lowered to 2Ω in the case of a $\lambda/4$ radiator. Now look what happens:

$$\text{Efficiency} = \frac{36.5\Omega}{36.5\Omega + 2\Omega} \times 100 = 94.8\%$$

Not much more need be said, except it can be easily seen from the above and Equation (2) that in the case of a $\lambda/4$ radiator, we have to lower the ground resistance to the same value as the radiation resistance (36.5Ω) in order to achieve at least 50% efficiency.

So, how can we make a ground system assuming that, unlike Radio Canada International, our antennas are not located in marshland? Here are some ideas:

- o Use lengths of bare copper or aluminum wire, AWG No. 10 or 12, each $\lambda/4$ in length.
- o Use as many radials as possible, solder the lengths together at a common point, and bury the radials with the center-point directly under the antenna. The antenna is insulated from the radials and the mast. The feedline inner conductor is connected to the antenna and the braided shield of the coax is connected to the radials.
- o Consider having the radials emanate from a ground rod driven 10 feet into the ground and sticking a few inches above the ground to facilitate connection to the antenna.
- o To increase ground conductivity in the vicinity of the ground rod, dig a circular trench of 18" inside diameter and 24" outside diameter and 12" deep, fill it with dry rock salt, magnesium sulphate or copper sulphate, flood the trench with water and then cover it with earth (lifetime of 50-lbs treating material: 2-3 years). Note: may be phytotoxic; for example, toxic level of copper to plants is about 25 parts per million (.0025%). Not recommended for use around gardens.

MULTI-BAND VERTICALS

Rather than having monoband verticals for each band, you will probably wish to consider purchase of one of the 10-80 metre multiband verticals that are available for home-station use. For your reference a list of the some of the more popular verticals currently available in the marketplace is given at the conclusion of this article.

Most, but not all of these are quarter-wave radiators that employ traps (high-Q parallel resonant circuits) which "automatically" isolate various sections of the antenna, depending on the frequency employed. You will recall from your basic radio theory that at resonance, a parallel-tuned series-connected circuit will present an extremely high impedance at the resonant frequency. Thus at 10 metres for instance, the lower section of the antenna below the first trap is resonant, as is the first trap (the 10 m trap) The first trap thus has a high impedance and the result is that the entire portion of the antenna above the first trap is electrically disconnected.

Similarly, at 15 metres, the portion of the antenna up to the second trap is resonant, as is the second trap up from the bottom (the 15 m trap), so the second trap presents a high impedance, thus isolating the portion of the antenna above it. The lower trap at 15 metres merely presents a small reactance, thus permitting the two bottom sections to act as one. And so it goes.

INSTALLATION IF YOU MUST MOUNT ON THE GROUND

The following procedure has worked well for the author for installing a ground-mounted vertical:

1. Dig a hole about 4 feet deep and 12-15 inches in diameter.
2. At the top of this hole, install a square wooden form, 12-15 inches to each side and about 6 inches in height, so that it protrudes about 2 inches above the surface of the ground.
3. Drive the bottom of a 1.5 inch diameter steel mast, 6 feet in length, to a depth of 1 foot below the bottom of the hole. The mast should thus protrude 1 foot above the surface of the ground. Make sure that the mast is centered in the hole and that it is vertical. If not, make adjustments using rocks wedged in the bottom of the hole to position the mast.
4. Drive a 10 foot steel ground rod into the bottom of the hole such that the rod is positioned about 6 inches away from the mast. The ground rod should be driven into the ground so that only about 6 inches protrude above the ground surface.

5. Run a 1 inch PVC pipe from the antenna site to you house. The author buried his pipe about 6 inches below the ground surface. At the antenna site, bring the pipe into the hole and up through the form. This may now be the opportune time to install your radial system. Remember, the ground rod in itself is not sufficient. (Bruce has assured me that he will install his radials any week now - Ed.)
6. There should be three items visible above the form: the mast in the center protruding 1-1.5 feet above the surface, the ground rod 6 inches from the center and protruding 6 inches above the surface, and about 6 feet of excess pipe through which the RG-8/U coaxial cable will be fed. It is wise to leave an excess because you will probably wish to allow for a partial loop in order to prevent rain from entering the pipe.
7. Fill the hole with ready-mix concrete and rocks. When you reach the form, fill to the top with concrete only.
8. You are now ready to mount the antenna to the mast, connect the ground system, and feed the coax through the pipe. You will find that this base is sturdy and will withstand high winds to which your antenna may be exposed.

SOME COMMERCIALY AVAILABLE MULTIBAND VERTICAL ANTENNAS

<u>Manufacturer</u>	<u>Model</u>	<u>Coverage</u>	<u>Comments</u>
Barker & Williamson	AV-25	80 - 10 + 30m	no-trap vertical. steel. 3 parallel vertical elements. broadband
Butternut	HF2V	80 & 40	add-on resonator kits for 160-30-20 m.
Cushcraft	AV-3 AV-5 R3	20 - 10 80 - 10 20 - 10	halfwave - eliminates need for radials. has remote tuning feature to control tuning capacitor in sealed matching-network assembly. reviewed in March '83 QST.
Heathkit	HDC-1080 HDC-1040 4-BTV 5-BTV 6-BTV	80 - 10 40 - 10 40 - 10 80 - 10 80 - 10	30 m conversion kit available includes 30 m.

Mosley	RV-4C	40 - 10	
Telex Hy-Gain	12AVQS	40 - 10	
	14AVQ/WBS	40 - 10	
	18AVT/WBS	80 - 10	
	18VS	80 - 10	base loading coil (must be manually switched to change bands). because of portability, good Field Day antenna if operating from remote location

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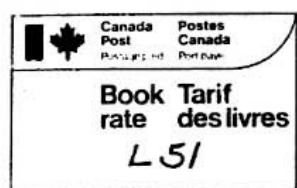
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VE3JW OPERATING SCHEDULE

If you wish to operate one of the weekend shifts not already reserved, please call Alan Boyce VE3LNH at 737-4937. The station may be used any time that the museum is open. Just present your current OARC membership card to the security staff in the office, just inside the museum entrance and you will receive the keys to the station.

<u>MAY</u>	<u>Morning 10AM-2PM</u>	<u>Afternoon 2PM-6PM</u>
Sat 4	Jerry VE3CDS, Alan VE3LNH	Hugo VE3KTN, Rick VE3HVA
Sun 5	Tom VE3OFM, Dave VE3OSY	Fred VE3BAJ, Jim VE3GJY
Sat 11	open	Pat VE3KJQ, Vance VE3OAO
Sun 12	open	Don VE3ATJ, Bucky VE3JRR
Sat 18	open	Mark VE3OWL, Dave VE3JTZ
Sun 19	Lloyd VE3AYE, Fred VE3NJF	Carl VE3BYX, Dave VE2ZP
Sat 25	Merve VE3CV, Bill VE3YK	Jim VE3JPC, Herb VE3HMF
Sun 26	John VE3FXF, Dan VE3EBI	Susan VE3OSP, Joan VE3OSE

The Ottawa Amateur Radio Club, Inc.
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